The Onyx

16-20 Medford Street

Somerville, Massachusetts

Transportation Impact Study

Prepared For:

Somerville Living, LLC

Prepared by:

Design Consultants, Inc.

(a division of GM2)

February 2022

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1. EXECUTIVE SUMMARY

1.1 Introduction

Design Consultants, Inc., a division of GM2 (DCI-GM2), has prepared this Transportation Impact Study (TIS) to analyze the potential impact that the proposed residential development at 16-20 Medford Street ("Project") will have on surrounding traffic operations in Somerville. The site was formerly occupied by a gas station and crude oil office headquarters. As background, 16 Medford Street was the former Somerville Gas & Service Station, and 20 Medford Street was the former Cubby Oil headquarters. The 16 Medford Street gas station provided four (4) gasoline pumping stations, and autobody repair shop, and a Massachusetts Vehicle Inspection location. 20 Medford Street housed the corporate office to Cubby Oil, all its crude oil tankers/trucks, repair trucks, and other heating and cooling equipment. It is our understanding that the Proponent is proposing to redevelop the site with an approximately 66,147 gross square foot (sf) mixed-use development that will consist of one (1) building containing 41 residential units, 3,500 square feet of first floor retail, and 43 on-site parking spaces.

1.2 Study Area

The following intersections, determined by DCI-GM2 in conjunction with the City of Somerville, were examined in this traffic study. Figure 1.2.1 shows the study intersections and Figure 1.2.2 shows the study intersections relative to the larger transportation network:

- Medford Street at South Street
- Medford Street at Warren Street
- South Street at Bedford Street
- South Street at Harding Street

1.3 Safety Analysis

A safety analysis was carried out at each of the study intersections based on crash data from the Massachusetts Department of Transportation (MassDOT) from 2017 to 2019, the most recent full three (3) years of complete data available.

The data was analyzed to determine high crash locations and analyze possible contributing factors. One (1) study area intersection had a crash that involved a pedestrian (resulting in a non-fatal injury) and zero (0) crashes involving a bicyclist. The detailed safety analysis and crash data is contained in Section 2.2.4 of this report.

1.4 Trip Generation

Trip generation was calculated using the Trip Generation Manual in combination with the 2015-2019 American Community Survey (ACS) 5-year estimates for Means of Transportation to Work in Census Tracts 3512.03 and 3515, as approved by the City of Somerville. It is expected that the site will generate 18 vehicle-trips during the Weekday AM peak hour, 19 vehicle-trips during the Weekday PM peak hour, 222 vehicle-trips during a typical Weekday, and 22 vehicle-trips during

the Saturday Midday peak hour. The calculations account for an approximate 60% reduction for non-vehicular residential trips. Further discussion and calculations are provided in Section 3.1.1.

1.5 Intersection Capacity Analysis

Capacity analyses were performed at each of the study intersections to assess traffic operations under two scenarios: 2022 Existing and 2022 Build conditions. It was determined, by the City of Somerville, that the Design Year Build scenario was not required for this report. The 2022 Existing Conditions analysis is based on January 2022 traffic data collected in the study area. The 2022 Build scenario combines the 2022 traffic volumes with the estimated Project-specific traffic volumes.

A summary table with the results of the capacity analyses is shown in Table 1.5-1. As shown, the proposed Project is not expected to have a significant impact on the surrounding traffic network. The changes to level of service for certain movements is due to the future re-orientation of South Street. Detailed analyses of each scenario are included later in this report.

Table 1.5-1: Level-of-Service Summary

ID	Roadway	Movement	2022 Existing Conditions			2022 Build Conditions		
			Weekday AM Peak Hour	Weekday PM Peak Hour	Sat. Midday Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Sat. Midday Peak Hour
1*	South Street at	WB	A	A	A	N/A	N/A	N/A
		EB	N/A	N/A	N/A	A	A	A
	Harding Street	NB	B	B	B	C	B	B
		SB	B	A	A	B	A	A
	Overall		--	--	--	--	--	--
2*	South Street at	WB	A	A	A	N/A	N/A	N/A
		EB	N/A	N/A	N/A	A	A	A
	Bedford Street	NB	B	A	B	A	A	A
	Overall		--	--	--	--	--	--
3*	Medford Street at	NB	A	A	A	A	A	A
		SB	A	A	A	A	A	A
	South Street	EB	N/A	N/A	N/A	B	B	B
	Overall		--	--	--	--	--	--
4*	Medford Street at	NW	A	A	A	A	A	A
		SE	A	A	A	A	A	A
	Warren Street	NE	C	D	C	B	C	C
	Overall		--	--	--	--	--	--

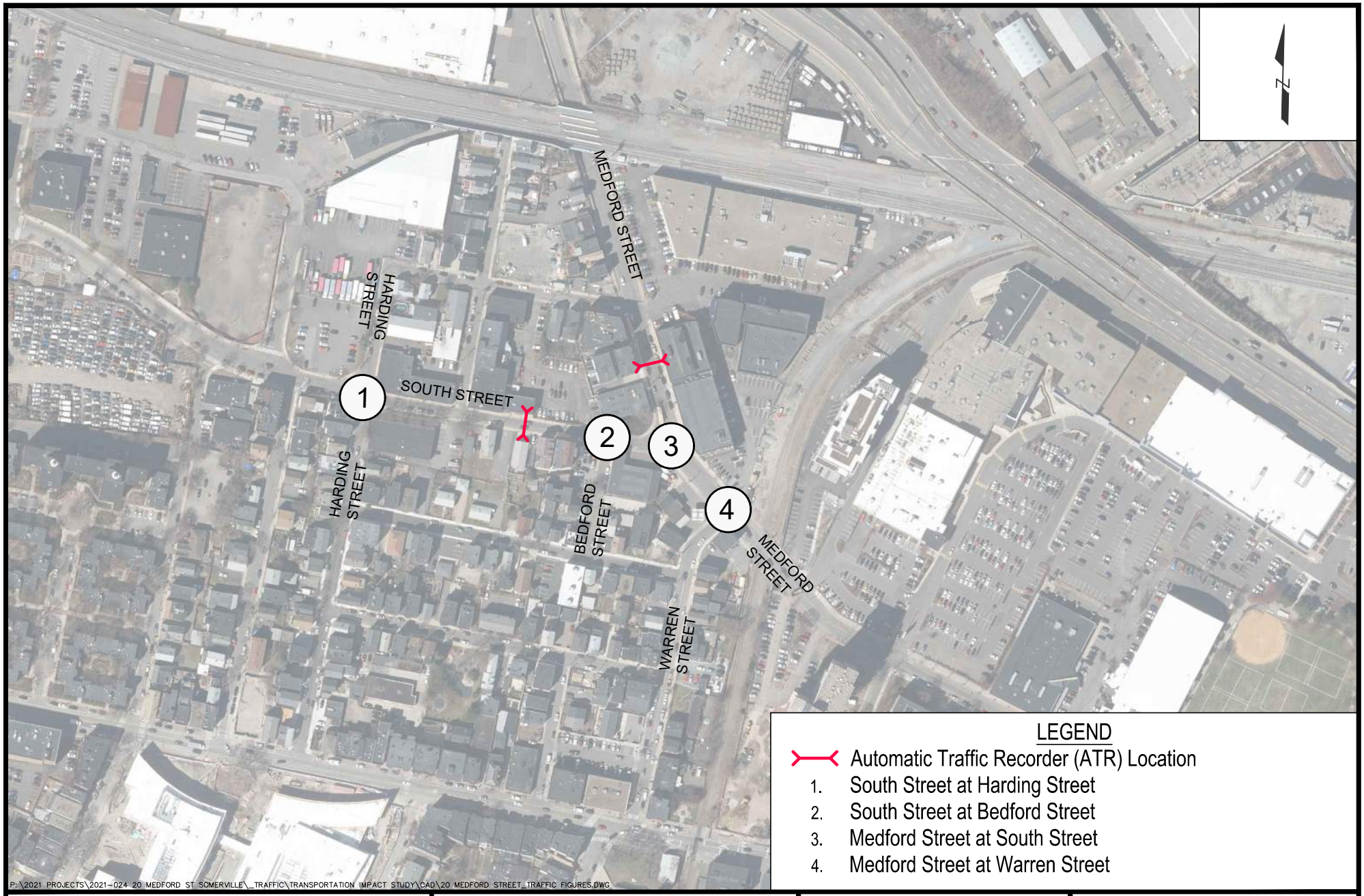
*Unsignalized Intersection

1.6 Conclusion

This Transportation Impact Study was prepared to assess and analyze any potential impact the proposed mixed-use building at 16-20 Medford Street will have on surrounding traffic operations in Somerville.

From a safety perspective, recent data shows the study intersections are relatively safe. One (1) study area intersection had a crash that involved a pedestrian resulting in a non-fatal. However, there were zero (0) reported fatal crashes, suggesting that conflicts between vehicles as well as vehicles and non-motorists are low speed. As such, the intersections will be able to handle the increased pedestrian and bicycle traffic generated by the Project site.

Capacity analyses were performed for the study intersections for the Weekday AM, Weekday PM, and Saturday Midday peak hours. Analyses were carried out for 2022 Existing and 2022 Build conditions. Vehicle-trips were redistributed through the network due to the future re-orientation of South Street, resulting in resulting in improved level of service for some movements. As such, the Project at 16-20 Medford Street is not expected to have a significant impact on the surrounding traffic network.



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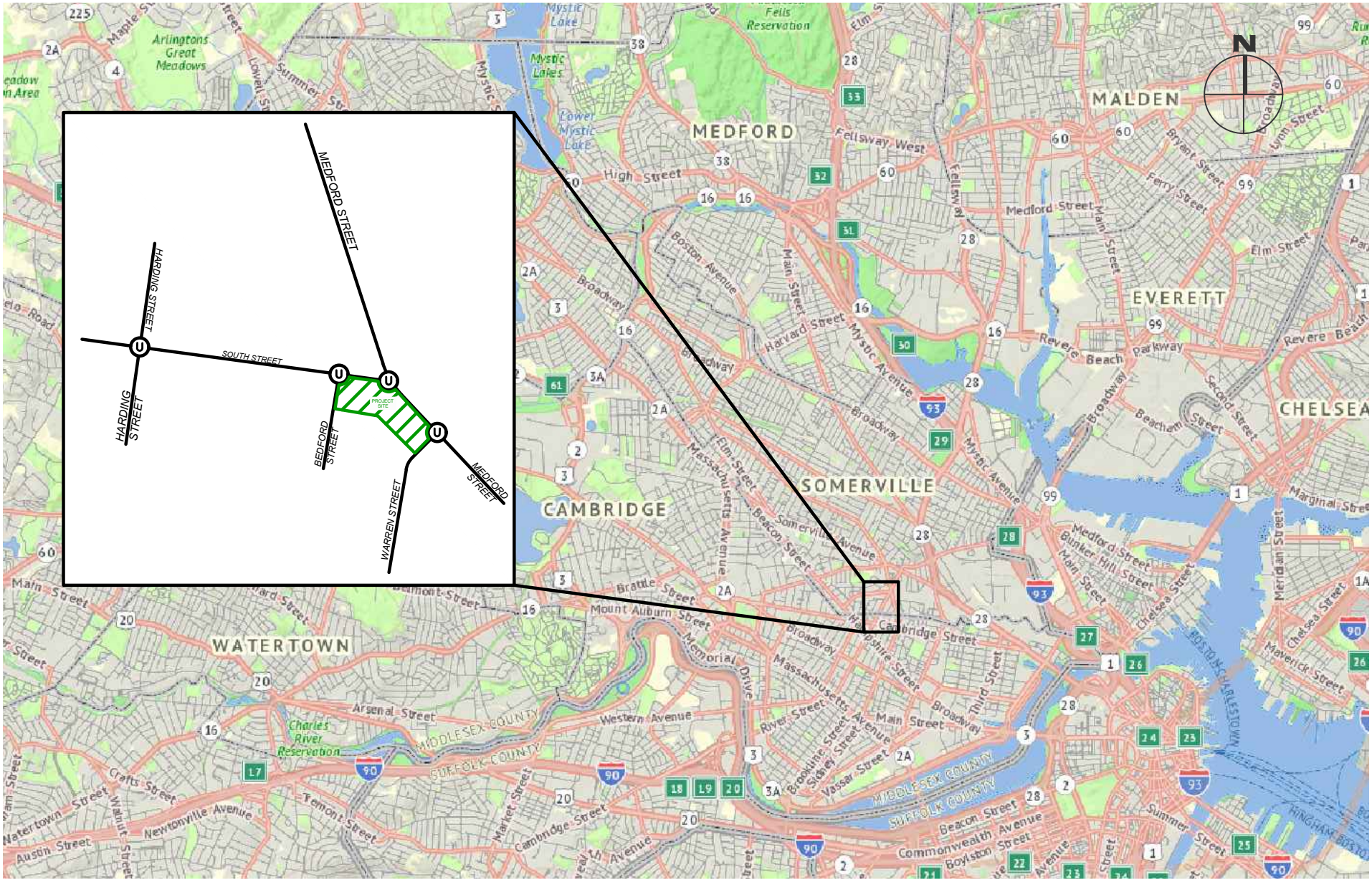
16-20 MEDFORD STREET SOMERVILLE, MA

STUDY INTERSECTIONS

DCI PROJECT NO.: 2021-024

DATE: JANUARY 2022

SCALE: N.T.S. | FIGURE 1.2.1



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16-20 MEDFORD STREET
SOMERVILLE, MA

LOCUS MAP

DCI PROJECT NO.: 2021-024

DATE: JANUARY 2022

SCALE: N.T.S. | FIGURE 1.2.2

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2. EXISTING CONDITIONS INVENTORY

2.1 Study Area

This section describes the geometric elements of the study area roadways and intersections, including intersection alignments, lane widths, channelization islands and medians, sidewalk widths, pedestrian curb cut ramps and crosswalks, bicycle lane treatments, and locations of bus stops.

2.1.1 Study Roadways

This section gives descriptions of the roadways located within the study area.

Medford Street (between Somerville Avenue and Warren Street)

Medford Street is classified as an Urban Minor Arterial under City of Somerville jurisdiction. Medford Street is a two-way, two-lane roadway with one (1) 10-foot travel lane, a 5-foot bicycle lane, and a 1 to 2.5-foot painted buffer with flexible posts in each direction. Short-term bicycle accommodations are at the following locations:

- One (1) U-shaped rack in front of 35 Medford Street

Overall, sidewalks along both sides of the roadway are currently in good condition and were recently reconstructed in 2020. The actual width of the sidewalk along the east side of the sidewalk varies between 6’ and 8’ with an effective sidewalk width varying between 4’ and 8’. The actual width of the sidewalk along the west side of the sidewalk varies between 6.5’ and 8’ with an effective sidewalk width varying between 4’ and 8.5’. There is no street furniture along this section of Medford Street. There are four (4) trees along the west side of the roadway and two (2) trees along the east side of the roadway. There are four (4) curb cuts that intersect the sidewalk along the west side of the roadway ranging between 16 and 42 feet wide. There are four (4) curb cuts that intersect the sidewalk along the east side of the street that range between 14 and 45 feet wide.

South Street (between Harding Street and Medford Street)

South Street is classified as a Local Road under City of Somerville jurisdiction. South Street is currently a one-way, one-lane roadway in the westbound direction between Medford Street and Harding Street with an approximate curb-to-curb width of 20 feet and parking permitted only on the south side of the roadway. There is no existing bicycle infrastructure provided on South Street. Through discussions with the City of Somerville Mobility Department, it was determined that South Street between Medford Street and Earle Street will change orientation in the future to an eastbound direction. The roadway will continue to operate as one-way. There will also be a bicycle lane in the eastbound direction and a contra-flow bicycle lane in the westbound direction. West of Earle Street there will be two-foot painted buffers in between the bicycle lanes and travel lanes. Short-term bicycle accommodations are at the following locations:

- One (1) U-Shaped bicycle rack opposite the Boynton Yards development
- One (1) U-Shaped bicycle rack at the Somerville South Street Community Garden

Overall, sidewalks are in fair condition along the north side of the roadway and good condition along both sides of the roadway. The actual width of the sidewalk along the north side of the roadway is 5' with the effective sidewalk width varying between 2' and 5'. The actual width of the sidewalk along the east side of the roadway is approximately 6' with the effective sidewalk width varying between 3' and 6'. There is no street furniture on either side of South Street. There are 11 trees along the north side of the roadway and 10 trees along the south side of the roadway. There are six (6) curb cuts that intersect the sidewalk along the north side of the roadway ranging between 15 and 38 feet wide. There are 10 curb cuts that intersect the sidewalk along the south side of the roadway ranging between 16 and 49 feet wide. According to the Somerville Mobility Department, curb cuts on South Street between Medford Street and Earle Street will be closed when the direction of travel is reversed and bicycle lanes are striped.

Warren Street (between Medford Street and Cambridge Street)

Warren Street is classified as an Urban Minor Arterial under City of Somerville jurisdiction north of Porter Street and City of Cambridge jurisdiction south of Porter Street. Warren Street is a one-way, one-lane roadway with an approximate curb-to-curb width of 26 feet and parking permitted on both sides of the roadway. There is no bicycle infrastructure along the roadway. Short-term bicycle accommodations are at the following locations:

- One (1) hitch bicycle rack at 697 Cambridge Street

Overall, sidewalks are in good condition along both sides of the roadway. The actual widths of the sidewalk along both sides of the roadway are approximately 7' with the effective sidewalk width varying between 4' and 7'. There is one bench along the west side of Warren Street and no street furniture along the east side of Warren Street. There are six (6) trees along the west side of the roadway and seven (7) trees along the east side of the roadway. There are four (4) curb cuts that intersect the sidewalk along the west side of the roadway ranging between 13 and 34 feet wide. There are six (6) curb cuts that intersect the sidewalk along the east side of the street that range between 14 and 50 feet wide.

Bedford Street (between South Street and Porter Street)

Bedford Street is classified as a Local Road under City of Somerville jurisdiction north of 4 Bedford Street and City of Cambridge jurisdiction south of 4 Bedford Street. Bedford Street is a two-way, two-lane roadway with an approximate curb-to-curb width of 20 feet and parking permitted on both sides. The approximate curb-to-curb width is 26 feet with parking permitted on both sides. There is no bicycle infrastructure or accommodations along Bedford Street.

Overall, sidewalks are in fair to good condition along both sides of the roadway. There are sections along both sides of the roadway with no sidewalk. The actual and effective width of the sidewalk along the west side of the roadway is 5'. The actual width of the sidewalk along the east side of the roadway is varies between 4' and 6' with the effective sidewalk width varying between 3' and 6'. There is no street furniture on either side of the roadway. There are zero (0) trees along either side of the roadway. There are three (3) curb cuts that intersect the sidewalk along the west side

of the roadway ranging between 20 and 28 feet wide. There is one (1) curb cut that intersects the sidewalk along the east side of the roadway, which is 16 feet wide.

Harding Street (between Ward Street and Porter Street)

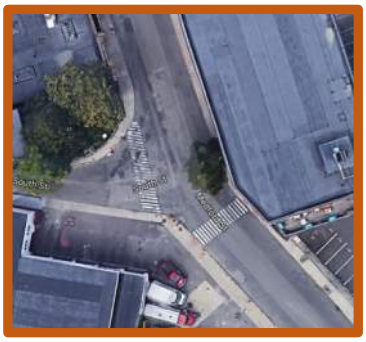
Harding Street is classified as a Local Road under City of Somerville jurisdiction north of 48 Harding Street and City of Cambridge jurisdiction south of 48 Harding Street. Harding Street is a one-way, one-lane roadway with an approximate curb-to-curb width of 20 feet and parking permitted on the west side of the roadway in the southbound direction between Ward Street and South Street. Harding Street is a one-way, one-lane roadway with an approximate curb-to-curb width of 20 feet and parking permitted on both sides in the northbound direction between Porter Street and South Street. There is no bicycle infrastructure or accommodations along Harding Street.

Overall, sidewalks are in fair to good condition along the west side of the roadway and good condition along the east side of the roadway. The actual width of the sidewalk along the west side of the roadway varies between 4' and 5' with the effective sidewalk width carrying between 2' and 5'. The actual and effective width of the sidewalk along the east side of the roadway is varies between 4' and 7'. There is no street furniture on either side of the roadway. There is one (1) tree along either side of the roadway. There are three (3) curb cuts that intersect the sidewalk along the west side of the roadway ranging between 10 and 18 feet wide. There are five (5) curb cuts that intersect the sidewalk along the east side of the roadway ranging between eight (8) and 42 feet wide.

2.1.2 Study Intersections

Medford Street at South Street

Medford Street at South Street is a three-legged, unsignalized intersection. There are marked crosswalks (10-feet wide with zebra-style striping) across each approach. The intersection has the following approach lane configurations:



Source: ©2021 Google Earth

Medford Street Northbound Approach:

- One (1) 10-foot through/left-turn lane
- One (1) 5-foot bicycle lane with 2.5-foot painted buffer and flexible posts

Medford Street Southbound Approach:

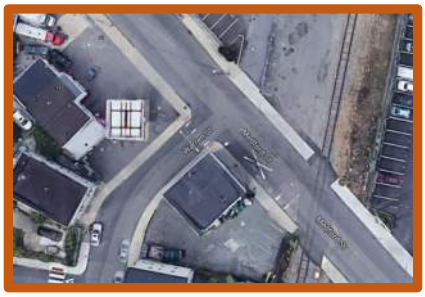
- One (1) 10-foot through/right-turn lane
- One (1) 5-foot bicycle lane with 1.5-foot painted buffer and flexible posts

South Street Westbound Departure:

- One (1) 20-foot departure lane
- Concrete rumble area and painted bump out on northwest corner

Medford Street at Warren Street

Medford Street at Warren Street is a three-legged, unsignalized intersection. The intersection has the following approach lane configurations:



Source: ©2021 Google Earth

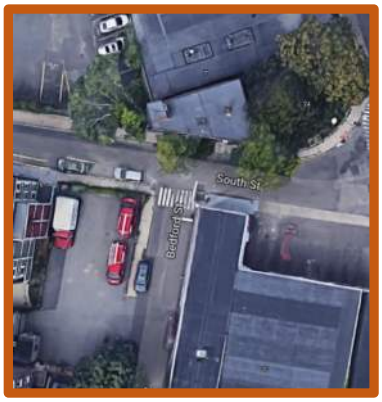
Medford Street Eastbound Approach:
- One (1) 12-foot wide through lane
- One (1) 5-foot bicycle lane

Medford Street Westbound Approach:
- One (1) 12-foot through lane
- One (1) 5-foot bicycle lane

Warren Street Northbound Approach:
- One (1) 20-foot left/right-turn lane
- 5-foot advisory bicycle lane striped across approach
- 10-foot crosswalk with zebra-style striping

South Street at Bedford Street

South Street at Bedford Street is a three-legged, unsignalized intersection. The intersection has the following approach lane configurations:



Source: ©2021 Google Earth

South Street Westbound Approach:
- Approximate 20-foot curb-to-curb width

South Street Westbound Departure:
- Approximate 20-foot curb-to-curb width

Bedford Street Northbound Approach:
- Approximate 20-foot curb-to-curb width
- 8-foot crosswalk with zebra-style striping

The intersection is proposed to have the following approach lanes in conjunction with the Boynton Yards development:

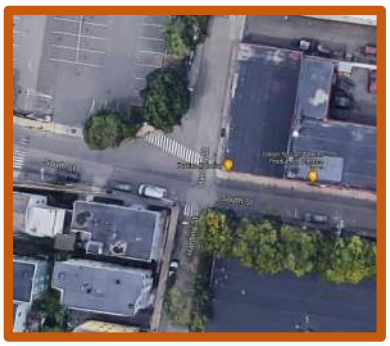
South Street Eastbound Approach:
- One (1) 10-foot through lane
- One (1) 5-foot bicycle lane

South Street Eastbound Departure:
- One (1) 10-foot travel lane
- One (1) 5-foot contra-flow bicycle lane

Bedford Street Northbound Approach:
- Approximate 20-foot curb-to-curb width
- 8-foot crosswalk with zebra-style striping
- Advisory bicycle lane striped across approach

South Street at Harding Street

South Street at Harding Street is a four-legged, unsignalized intersection. The intersection has the following approach lane configurations:



Source: ©2021 Google Earth

South Street Westbound One-way Approach:
- Approximate 20-foot curb-to-curb width

South Street Westbound Departure:
- Approximate 30-foot curb-to-curb width

Harding Street Northbound One-way Approach:
- Approximate 20-foot curb-to-curb width
- 8-foot crosswalk with zebra-style striping

Harding Street Southbound One-way Approach:
- Approximate 20-foot curb-to-curb width
- 10-foot crosswalk with zebra-style striping

The intersection is proposed to have the following approach lanes in conjunction with the Boynton Yards development:

South Street Eastbound Approach:
- One (1) 10-foot through lane
- One (1) 5-foot bicycle lane

South Street Eastbound Departure:
- One (1) 10-foot travel lane
- One (1) 5-foot contra-flow bicycle lane

Harding Street Northbound Approach:
- Approximate 20-foot curb-to-curb width
- 8-foot crosswalk with zebra-style striping
- Advisory bicycle lane striped across approach

Harding Street Southbound Approach:
- Approximate 20-foot curb-to-curb width
- 8-foot crosswalk with zebra-style striping
- Advisory bicycle lane striped across approach

2.1.3 Transit and Land Use Figures

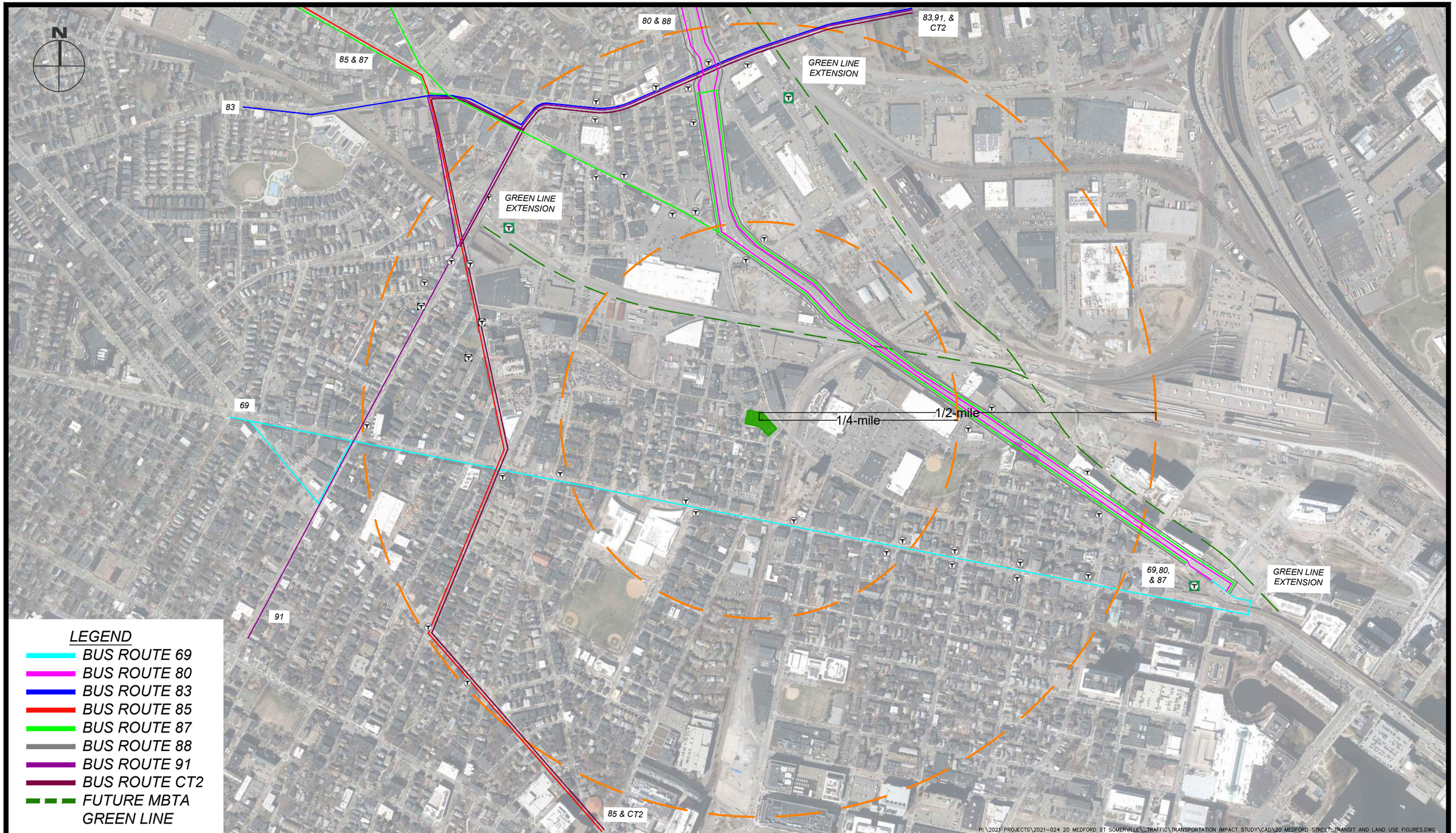
Figures were produced that show the transit services and land uses within the study area and expanded out to an approximate ¼-mile and ½-mile radius from the Project site. The following elements are shown in each:

Transit Services (Figure 2.1.1)

- All bus stops and transit stations
- Bus routes through the study area

Land Uses (Figure 2.1.2)

- Schools
- Parks/Playgrounds
- Public Safety Buildings
- Hospitals



Design Consultants Inc.
Somerville - South Shore
www.dci-ma.com

PROJECT TEAM

DEVELOPER:
SOMERVILLE LIVING, LLC
P.O. BOX 780
LYNNFIELD, MA 01940

SITE NAME/ADDRESS

16-20 MEDFORD STREET
SOMERVILLE, MA

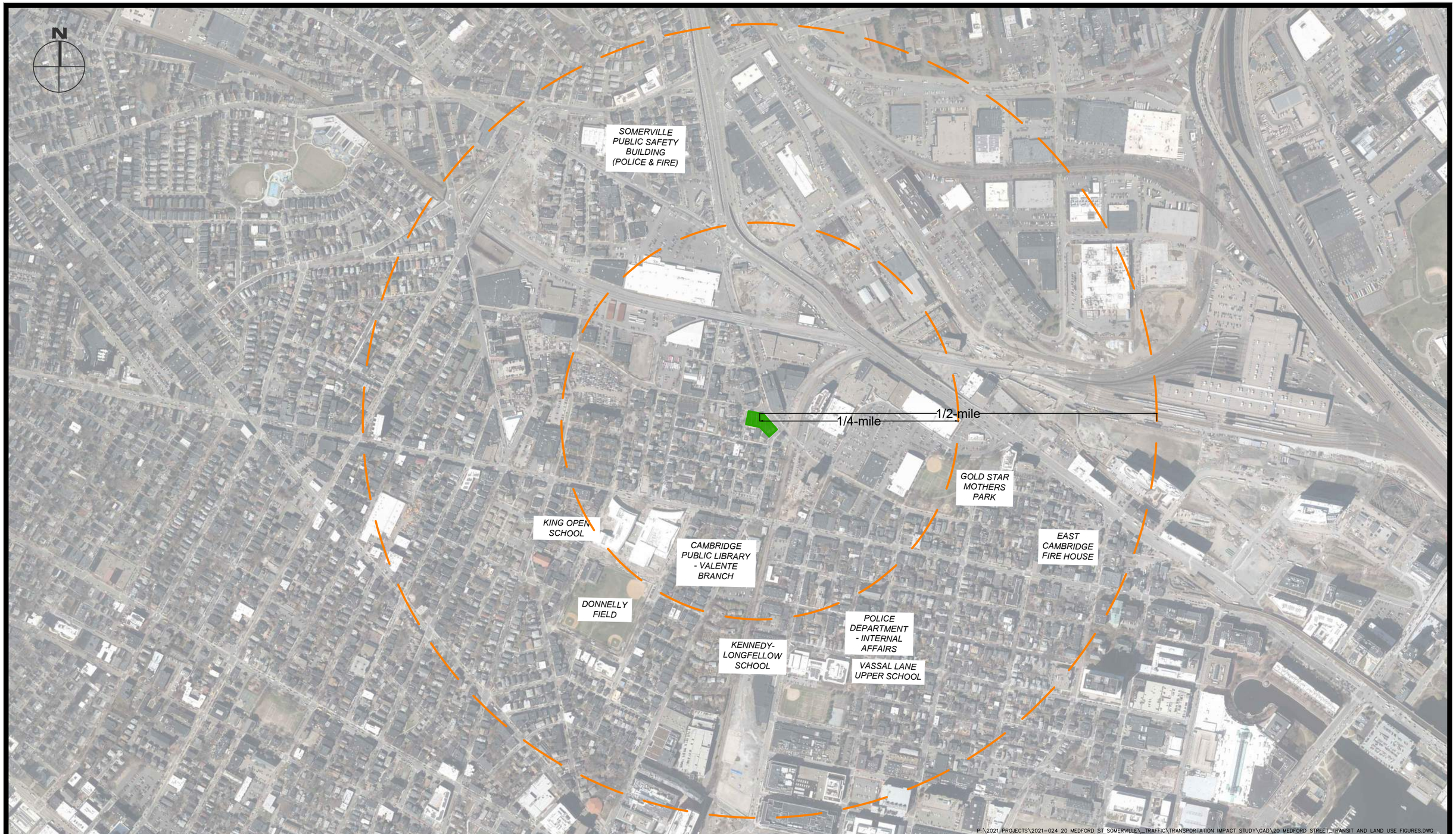
SHEET NAME

Transit Services Plan

SHEET #

Figure 2.1.1

DR BY: LV/SGS
CHK BY: SGS
PROJ NO.: 2021-024
DATE: JANUARY 2022
SCALE: 1" = 600'



Design Consultants Inc.
Somerville - South Shore
www.dci-ma.com

PROJECT TEAM

DEVELOPER:
SOMERVILLE LIVING, LLC
P.O. BOX 780
LYNNFIELD, MA 01940

SITE NAME/ADDRESS

16-20 MEDFORD STREET
SOMERVILLE, MA

SHEET NAME

Land Use Plan

SHEET #

Figure 2.1.2

DR BY: LV/SGS
CHK BY: SGS
PROJ NO.: 2021-024
DATE: JANUARY 2022
SCALE: 1" = 600'

2.2 Existing Conditions Data Collection

2.2.1 Automatic Traffic Recorder (ATR) Counts

Automatic Traffic Recorder (ATR) counts were collected in January 2022. The ATR data is summarized in Table 2.2-1.

Table 2.1-1: ATR Data Summary

Location	ADT[1]	ADT[2]	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
			Volume[3]	K[4]	Peak Direction	Volume[3]	K[4]	Peak Direction	Volume[3]	K[4]	Peak Direction
Medford Street North of South Street	10,662	7,778	672	6%	65.0% SB	746	7%	55.6% NB	606	8%	53.8% NB
South Street West of Bedford Street	3,413	2,073	325	10%	100% WB	198	6%	100% WB	151	7%	100% WB

[1]Average Daily Traffic between 01/13/2022 and 1/14/2022; [2]Average Daily Traffic for 01/15/2022; [3]Peak hour volumes are calculated based on peak hours from the TMCs (7:30am to 8:30am, 5:00pm to 6:00pm, 12:00pm to 1:00pm); [4]K = peak hour volume divided by the ADT

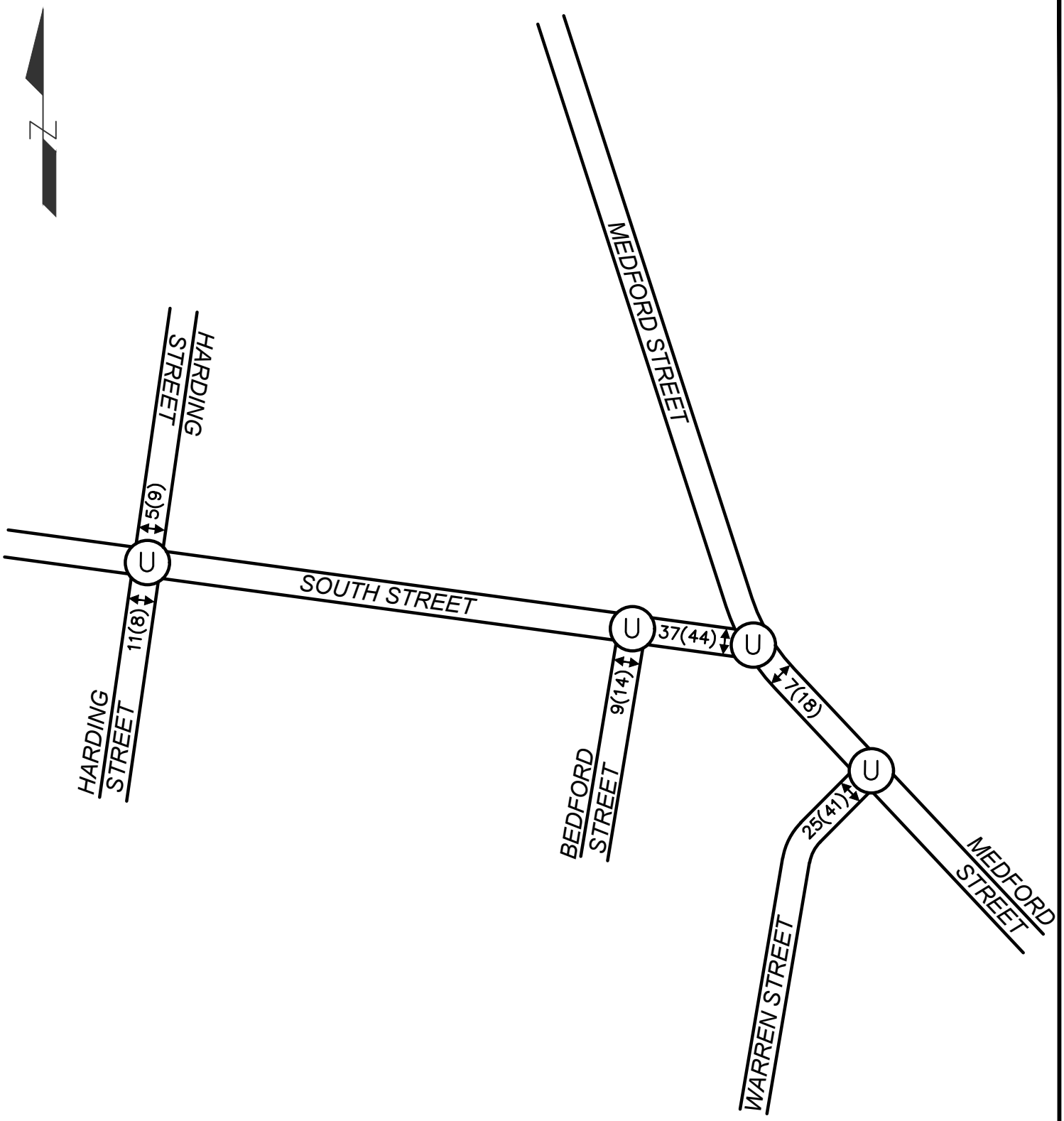
2.2.2 Pedestrian and Bicycle Counts

Pedestrian and bicycle volume data was determined from the January 2022 data, as described below. The pedestrian turning movement counts are shown graphically in Figure 2.2.1 and the bicycle turning movement counts are shown graphically in Figure 2.2.2. The raw data is attached in Appendix A and will be submitted electronically to the City of Somerville.

2.2.3 Intersection Turning Movement Counts (TMCs)

According to the *TIS Guidelines* produced by the City of Somerville, turning movement counts (TMCs) are to be collected during the Weekday (6:00am to 8:00pm) and Saturday Midday (10:00am to 2:00pm) peak periods for all study intersections. The traffic counts included cars, heavy vehicles, pedestrians, and bicycles. The raw traffic data is attached in Appendix A and will be submitted electronically to the City of Somerville.

The existing turning movement count data, for both the peak hours and the entire peak period, is shown graphically in Figures 2.2.3 to 2.2.8.



Legend

XX(YY) → 2022 Existing Weekday AM(Weekday PM) Peak Hour Pedestrian Volumes

Note: Imbalances due to numerous pedestrian routes not shown
S = Signalized Intersection; U = Unsignalized Intersection

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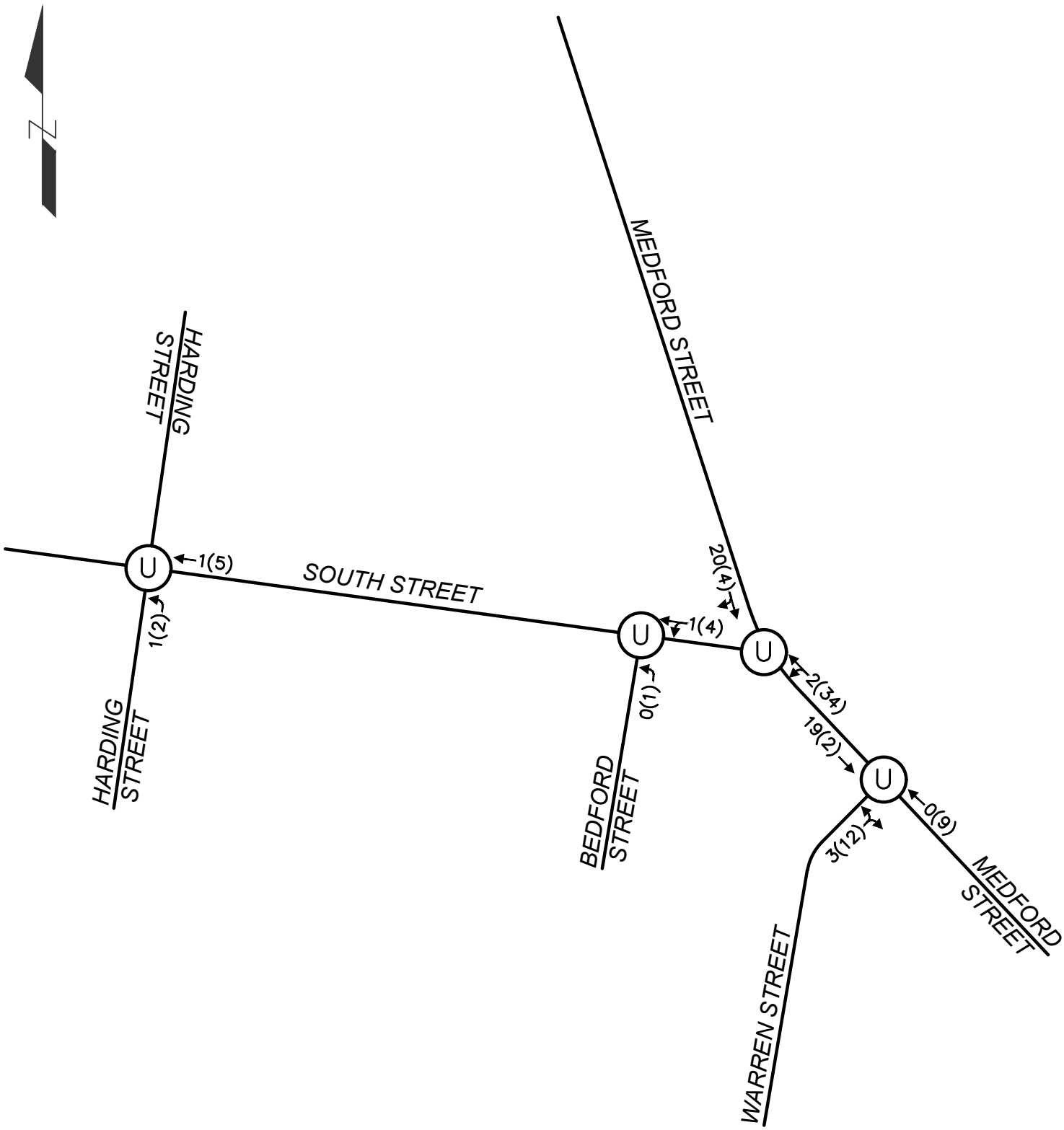
Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Weekday Peak Hour Pedestrian Volumes	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 2.2.1



Legend

XX(YY)→ 2022 Existing Weekday AM(Weekday PM) Peak Hour Bicycle Volumes

Note: Imbalances due to numerous pedestrian routes not shown
S = Signalized Intersection; U = Unsignalized Intersection

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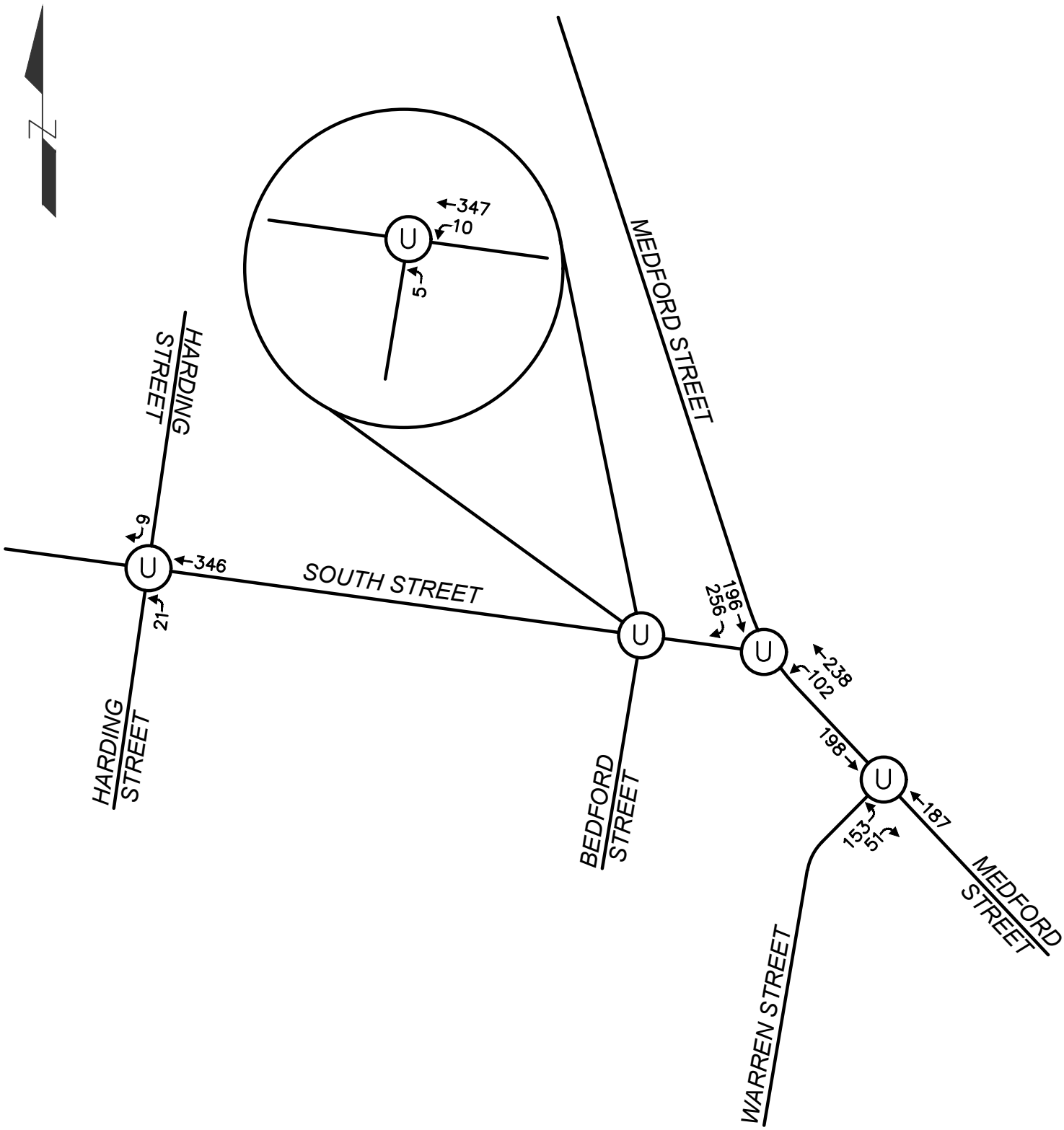
DCi Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Weekday Peak Hour Bicycle Volumes	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 2.2.2



Legend

XX → 2022 Existing Weekday AM Peak Hour Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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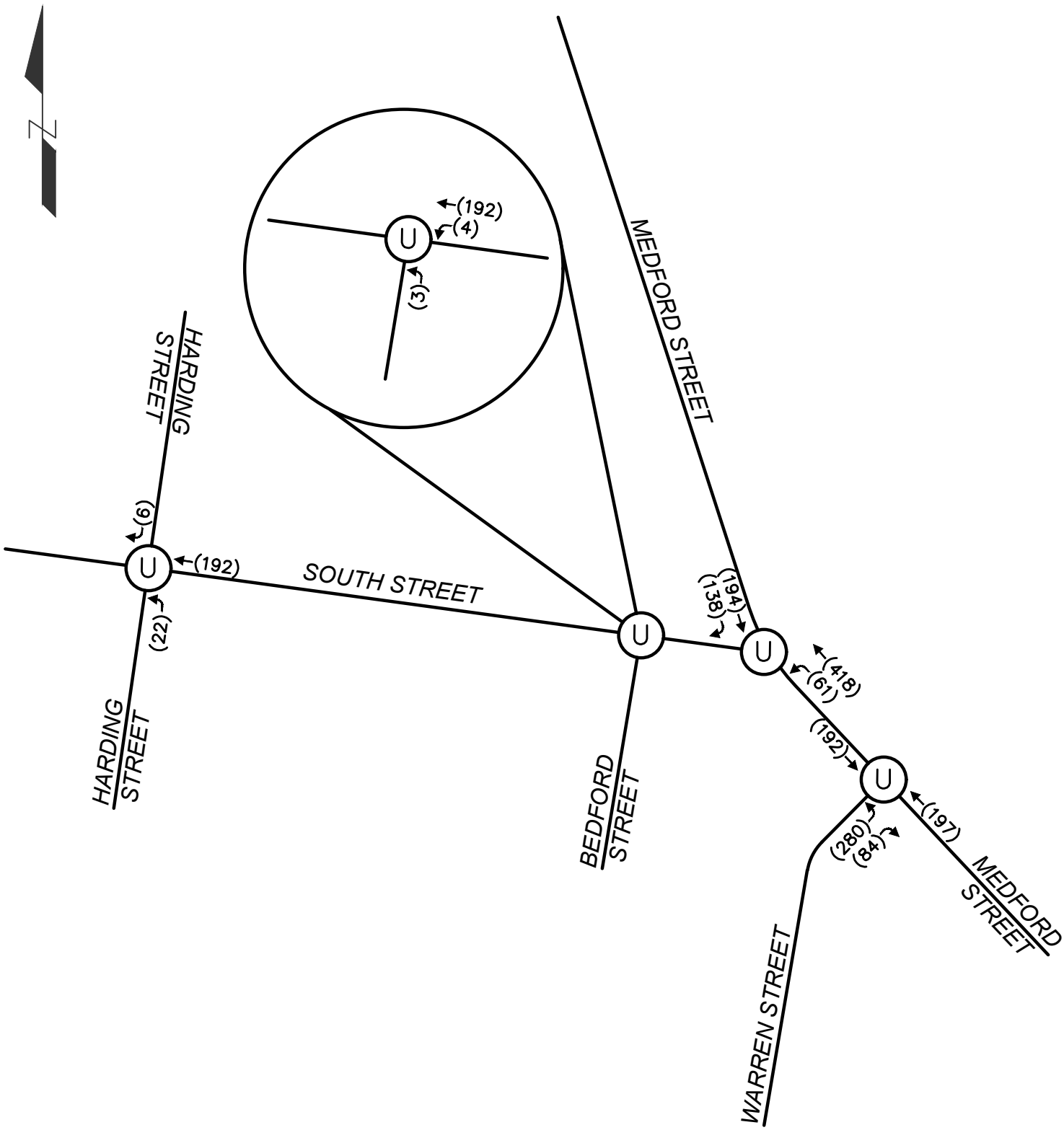
DCI Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Weekday AM Peak Hour Vehicle Volumes	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 2.2.3



Legend

(YY) → 2022 Existing Weekday PM Peak Hour Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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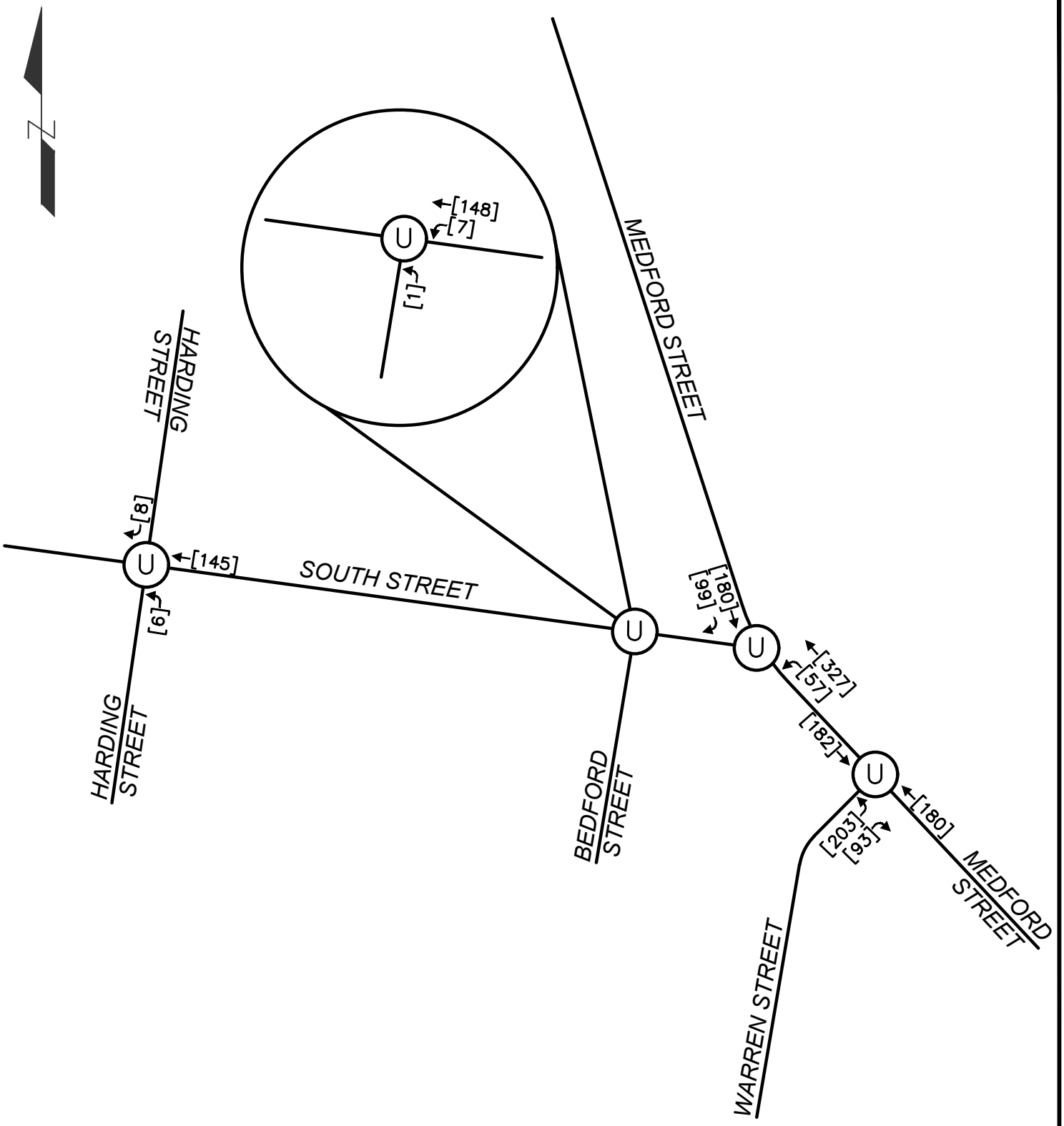
DCi Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Weekday PM Peak Hour Vehicle Volumes	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 2.2.4



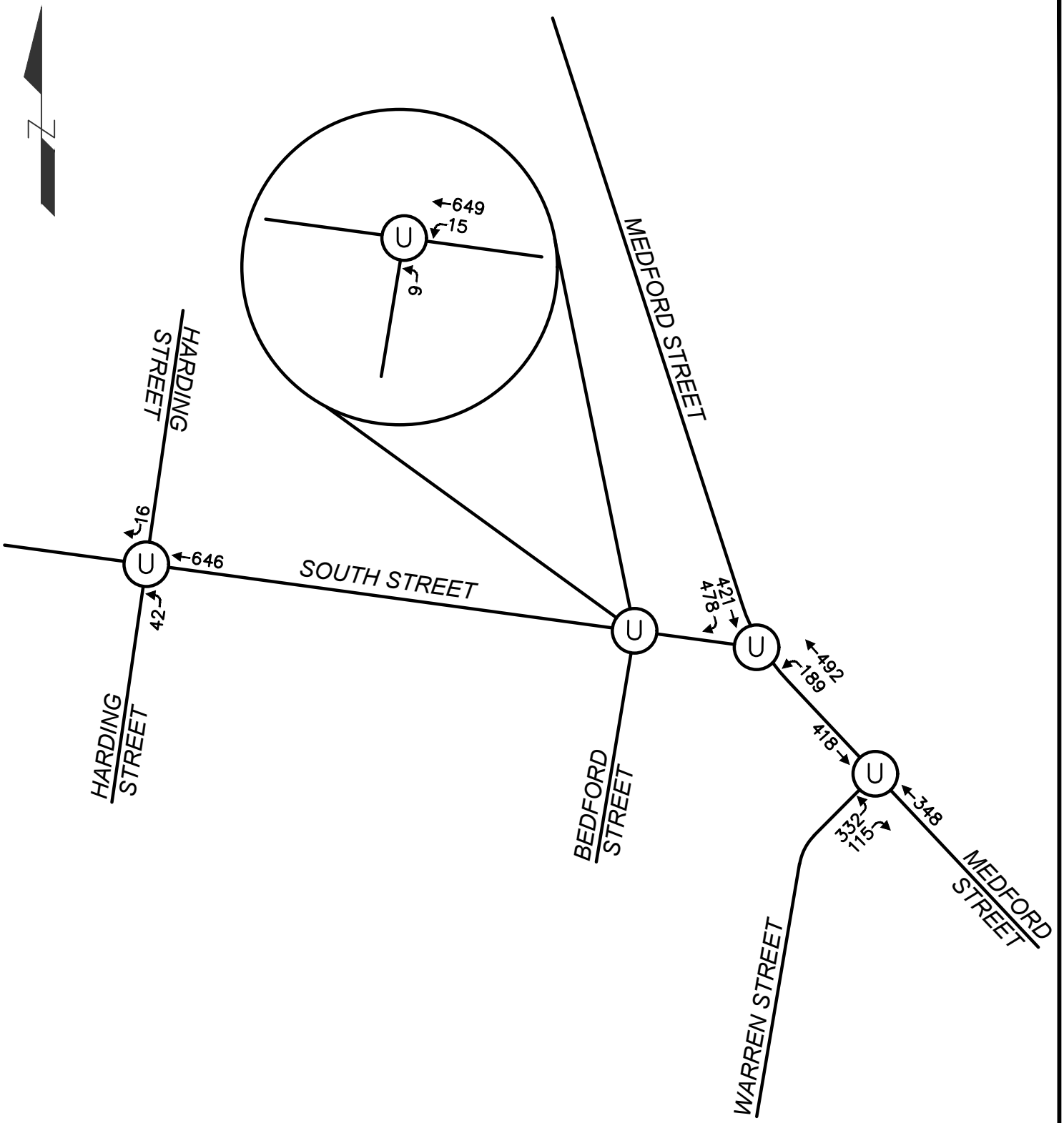
Legend

[ZZ] → 2022 Existing Saturday Midday Peak Hour Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

P:\2021 PROJECTS\2021-024 20 MEDFORD ST SOMERVILLE_TRAFFIC\TRANSPORTATION IMPACT STUDY\CAD\20 MEDFORD STREET_TRAFFIC FIGURES.DWG

DCI Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Saturday Midday Peak Hour Vehicle Volumes	DCI PROJECT NO.: 2021-024 DATE: JANUARY 2022 SCALE: N.T.S. Figure 2.2.5



Legend

XX → 2022 Existing Weekday AM Peak Period Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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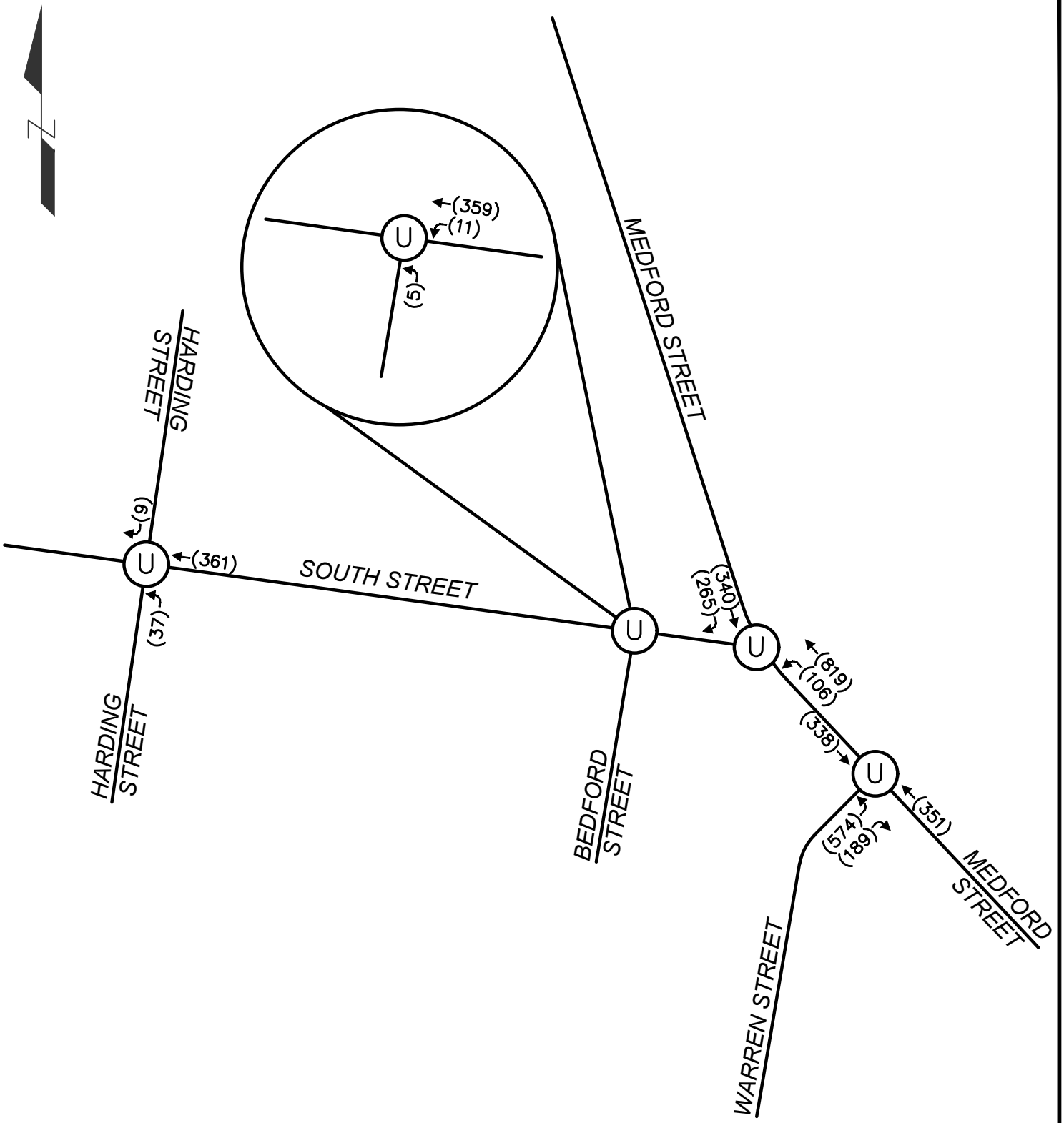
DCI Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Weekday AM Peak Period Vehicle Volumes	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 2.2.6



Legend

(YY) → 2022 Existing Weekday PM Peak Period Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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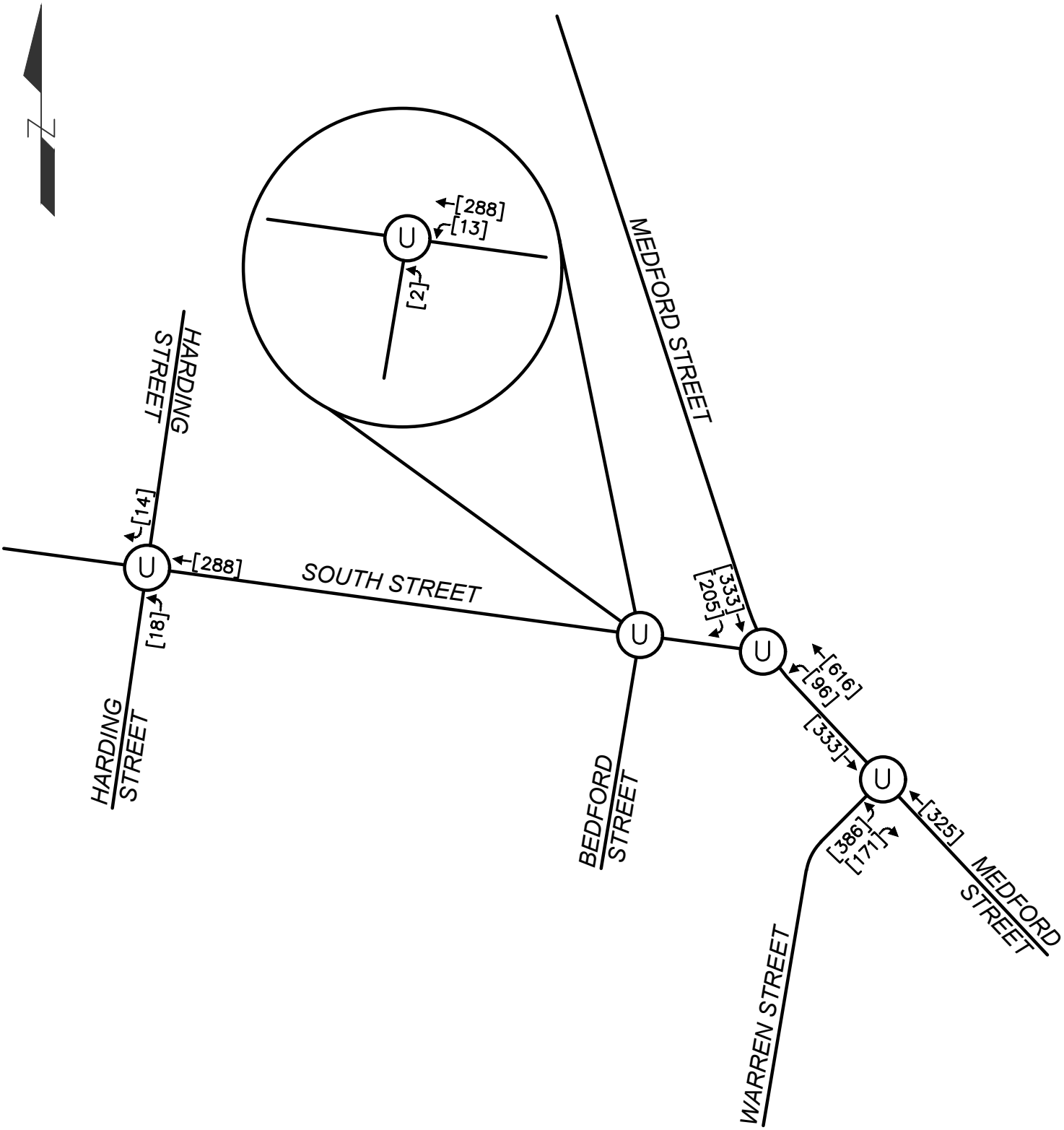
DCi Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Weekday PM Peak Period Vehicle Volumes	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 2.2.7



Legend

(ZZ) → 2022 Existing Saturday Midday Peak Period Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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DCI Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Existing Saturday Midday Peak Period Vehicle Volumes	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 2.2.8

2.2.4 Traffic Crashes

Intersection safety is one measure of assessing the performance of an intersection and can also have an impact on overall intersection operations. This section reviews historical crash data to identify any potential safety concerns.

Crash data from MassDOT for years 2017 through 2019 was reviewed for each study intersection. This data represents the most recent three (3) full years of complete data available from the MassDOT database. MassDOT states that crash data for the years after 2019 are subject to change and are not to be considered complete. The crash records offered the following information:

- Crash Date
- Crash Type
- Injury (if applicable)
- Involvement of trucks and/or MBTA buses
- Involvement of pedestrians and/or bicycles (if applicable)
- Lighting/Surface Condition/Weather

The compiled data, in conjunction with engineering judgement, yielded a summary of crashes that may be used to identify general crash patterns and potential factors contributing to the predominant type of incidents at each location. The summary results of the crash analysis are shown in Table 2.2-1. Raw crash data for each intersection for years 2017 through 2019 are contained in Appendix B.

Table 2.2-1: Intersection Crash Summary

	Medford Street at South Street	*Medford Street at Warren Street*	*South Street at Harding Street*	*South Street at Bedford Street*
Year				
2017	0	0	0	0
2018	1	0	1	0
2019	1	0	0	0
Total	***2***	***0***	**1**	**0**
Crash Type				
Sideswipe, Same Direction	0	0	0	0
Sideswipe, Opposite Direction	0	0	0	0
Angle	1	0	0	0
Rear-end	0	0	0	0
Head-on	0	0	0	0
Single Vehicle	1	0	1	0
Other, not reported	0	0	0	0
Total	***2***	***0***	**1**	**0**
Injuries				
None (Property Damage Only)	1	0	0	0
Non-fatal Injury	1	0	1	0
Fatal Injury	0	0	0	0
Not Reported, Unknown	0	0	0	0
Total	***2***	***0***	**1**	**0**
Involvement of Trucks/MBTA Bus				
Trucks	0	0	0	0
MBTA Buses	0	0	0	0
Neither	2	0	1	0
Total	***2***	***0***	**1**	**0**
Non-Motorist Involved				
Pedestrian	0	0	1	0
Bicyclist	0	0	0	0
Other Non-Motorist	0	0	0	0
Neither	2	0	1	0
Total	***2***	***0***	**0**	**0**
Roadway Lighting				
Daylight	2	0	1	0
Dusk	0	0	0	0
Dark - Roadway Lighted	0	0	0	0
Dark - Roadway Not Lighted	0	0	0	0
Other, Not Reported	0	0	0	0
Total	***2***	***0***	**1**	**0**
Surface Condition				
Dry	1	0	1	0
Wet	1	0	0	0
Snow/Ice	0	0	0	0
Other, Not Reported	0	0	0	0
Total	***2***	***0***	**1**	**0**
Weather				
Clear	0	0	1	0
Cloudy	1	0	0	0
Rain	0	0	0	0
Snow/Sleet	1	0	0	0
Other, Not Reported	0	0	0	0
Total	***2***	***0***	**1**	**0**

The intersection of Medford Street at South Street had two (2) reported crashes according to the MassDOT crash database during the three-year period from 2017 to 2019. One (1) of the crashes resulted in property damage only and one (1) resulted in a non-fatal injury. Zero (0) of the crashes involved either a heavy vehicle or MBTA bus. Zero (0) of the crashes involved either a pedestrian or a bicyclist. The intersection averaged 0.67 crashes per year.

The intersection of Medford Street at Warren Street had had zero (0) reported crashes according to the MassDOT crash database during the three-year period from 2017 to 2019.

The intersection of Medford Street at Harding Street had one (1) reported crash according to the MassDOT crash database during the three-year period from 2017 to 2019. The crash resulted in a non-fatal injury. Zero (0) of the crashes involved either a heavy vehicle or MBTA bus. The crash involved a pedestrian and zero (0) bicyclists. The intersection averaged 0.33 crashes per year.

The intersection of South Street at Bedford Street had zero (0) reported crashes according to the MassDOT crash database during the three-year period from 2017 to 2019.

One (1) study intersection has crashes that involved either a pedestrian or bicyclist resulting in injury. However, there were zero (0) reported fatal crashes, suggesting that conflicts between vehicles as well as vehicles and non-motorists are low speed. As such, the intersections will be able to handle the increased pedestrian and bicycle traffic generated by the Project site, and there are no safety issues that need to be mitigated as part of this Project.

2.2.5 Public Transit

Within the study area, the Massachusetts Bay Transportation Authority (MBTA) provides bus routes and rapid transit rail service. There are eight (8) bus routes and one (1) future rapid transit rail line that have stops/stations within ½-mile of the Project site. This section describes each bus route and rapid transit rail station, including amenities/deficiencies for each of the closest stops. Routes 80, 87, and 88 and 86, 91, and CT2 share the same inbound and outbound stops. Detailed schedules and routes are attached in Appendix C.

Bus Route 69

Bus Route 69 runs between Harvard (a stop on the MBTA Red Line) in Cambridge and Lechmere Station (a stop on the MBTA Green Line) in Cambridge. The closest inbound stop is located at Cambridge Street at Max Avenue, approximately 0.2 miles from the Project site. There are no amenities located at this stop for waiting passengers and there is ample pull over area for the bus. The closest outbound stop is located at Cambridge Street at Lambert Street, approximately 0.2 miles from the Project site. There are no amenities located at this stop for waiting passengers and there is ample pull over area for the bus.

Bus Route 80

Bus Route 80 runs between Arlington Center in Arlington and Lechmere Station. The closest inbound stop is located at McGrath Highway at Medford Street, approximately 0.2 miles from the Project site. There are no amenities located at this stop for waiting passengers and there is ample

pull over area for the bus. The closest outbound stop is located at the corner of McGrath Highway at Poplar Street, approximately 0.3 miles from the Project site. There is a pedestrian shelter at this stop with a bench provided for waiting passengers. There is also ample pull-over area for the bus.

Bus Route 85
Bus Route 85 runs between Spring Hill in Somerville and Kendall/MIT Station (a stop on the MBTA Red Line) in Cambridge. The closest inbound stop is located at Webster Avenue at Norfolk Street, approximately 0.5 miles from the Project site. There are no amenities located at this stop for waiting passengers and there is ample pull over area for the bus. The closest outbound stop is located at Webster Avenue at Columbia Street, approximately 0.5 miles from the Project site. There are no amenities located at this stop for waiting passengers and there is ample pull over area for the bus.

Bus Route 86
Bus Route 86 runs between Sullivan Station (a stop on the MBTA Orange Line) in Boston and Cleveland Circle in Cambridge. The closest inbound stop is located at Medford Street at Washington Street, approximately 0.5 miles from the Project site. There is a pedestrian shelter at this stop with a bench provided for waiting passengers. There is also ample pull-over area for the bus. The closest outbound stop is located at Washington Street at McGrath Highway, approximately 0.4 miles from the Project site. There are no amenities located at this stop for waiting passengers and there is ample pull over area for the bus.

Bus Route 87
Bus Route 87 runs between Clarendon Hill in Somerville or Arlington Center in Arlington and Lechmere Station. The closest inbound stop is located at McGrath Highway at Medford Street. The closest outbound stop is located at McGrath Highway at Poplar Street.

Bus Route 88
Bus Route 88 runs between Clarendon Hill and Lechmere Station. The closest inbound stop is located at McGrath Highway at Medford Street. The closest outbound stop is located at McGrath Highway at Poplar Street.

Bus Route 91
Bus Route 91 runs between Central Square in Cambridge and Sullivan Station. The closest inbound stop is located at Medford Street at Washington Street, approximately 0.5 miles from the Project site. The closest outbound stop is located at Washington Street at McGrath Highway, approximately 0.4 miles from the Project site.

Bus Route CT2
Bus Route CT2 runs between Sullivan Station and Ruggles Station in Roxbury. The closest inbound stop is located at Medford Street at Washington Street, approximately 0.5 miles from the Project site. The closest outbound stop is located at Washington Street at McGrath Highway, approximately 0.4 miles from the Project site.

MBTA Light Rail Stops

There are two (2) future Green Line station within 1/2-mile of the Project site: Union Square Station and East Somerville Station.

Union Square Station

Union Square Station will be located along Prospect Street with an at-grade entrance accessed via Bennett Court with emergency access/egress pathway to Allen Street. The station will feature a 225-foot long platform with five (5) benches. There will be 86 covered bicycle parking spaces and 34 uncovered bicycle parking spaces, as well as reconstructed sidewalks around the station with a width of 10+ feet.

East Somerville Station

East Somerville Station will be located along Joy Street with an at-grade entrance accessed via the Washington Street Access Path with emergency access/egress pathway to the Somerville Community Path. The station will feature a 225-foot platform with five (5) benches. There will be 52 covered bicycle parking spaces and 20 uncovered bicycle parking spaces. Detailed plans have been attached in Appendix C.

2.2.6 Parking

The existing on-site parking area will not remain, and both covered and secured parking areas that meet zoning requirements will be constructed. Therefore, a study of on-street parking utilization in the study area is not required.

2.2.7 Traffic Signal Timing Information

There were no signalized intersections that were part of this TIS.

2.3 Existing Conditions Transportation Analysis

Traffic Analysis Criteria

The Highway Capacity Manual (HCM), published by the Transportation Research Board, provides methodologies on how to calculate motor vehicle Level of Service (LOS), average delay, and volume-to-capacity (v/c) ratios.

Level of Service (LOS) is a term used to denote different operating conditions that occur under various traffic volume loads. It is a qualitative measure of the effect of several factors including geometrics, speed, travel delay, freedom to maneuver, and safety. The LOS is divided into a range of six letter grades, ranging from A to F, with A being the best and F the worst. A LOS of F is generally considered to be inadequate traffic operation in suburban and urban areas. The delay ranges differ slightly between unsignalized and signalized intersections due to driver expectations and behavior for each LOS. Table 2.3-1 summarizes the LOS criteria.

Table 2.3-1: Intersection LOS Thresholds

LOS	Signalized Control Delay (sec/veh)	Unsignalized Control Delay (sec/veh)
A	0-10	0-10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

Source: 2010 Highway Capacity Manual

In this study, intersection performance measures were calculated in the form of average intersection delay, 50th and 95th percentile queue lengths, level-of-service (LOS) for each approach/movement, and the LOS of the overall intersection operations. *Synchro 11.0* was the software used to execute the intersection analysis. *Synchro 11.0*, a software program from Trafficware, uses the methodologies and thresholds outlined within the HCM.

Four (4) types of Synchro reports were created to analyze and compare intersection performance:

- Main report – "Int: Lanes, Volumes, Timings",
- Queuing Analysis Report
- HCM 2000 Signalized/Unsignalized Report.
- HCM 2010 Signals Pedestrian Report

For signalized intersections, LOS is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. The 50th and 95th percentile queue lengths are estimated and were compared to queues observed in the field.

2.3.1 Vehicle Analysis

The study intersections were analyzed using the collected January 2022 traffic data. Intersection lane configurations, signal timings, and traffic control were modelled the same as they currently are, representing typical travel conditions. The results of the 2022 Existing conditions analysis are shown in Table 2.3-2. Detailed capacity analysis worksheets are included in Appendix E.

As shown in Table 2.3-2, most movements operate at acceptable levels of service throughout the study area. There are zero (0) movements that operate at a level of service F. This analysis serves as a basis for comparison for the 2022 Build Conditions scenario, detailed in Section 3.1.3.

Table 2.3-2: 2022 Existing Conditions Level of Service

ID	Roadway	Movement	2022 Existing Conditions											
			Weekday AM Peak Hour				Weekday PM Peak Hour				Saturday Midday Peak Hour			
			v/c[1]	Delay[2]	LOS[3]	Queue[4]	v/c[1]	Delay[2]	LOS[3]	Queue[4]	v/c[1]	Delay[2]	LOS[3]	Queue[4]
1*	South Street at	WB	0.01	0.3	A	-- / 1	0.01	0.3	A	-- / 0	0.01	0.0	A	-- / 0
	Harding Street	NB	0.06	12.9	B	-- / 5	0.04	10.5	B	-- / 3	0.02	10.0	B	-- /1
		SB	0.03	10.9	B	-- / 2	0.01	9.4	A	-- / 1	0.01	9.2	A	-- / A
	Overall			--	--			--	--			--	--	
2*	South Street at	WB	0.01	0.3	A	-- / 1	0.00	0.2	A	-- / 0	0.01	0.4	A	-- / 0
	Bedford Street	NB	0.01	11.3	B	-- / 1	0.01	9.8	A	-- / 0	0.01	10.1	B	-- / 0
	Overall			--	--			--	--			--	--	
3*	Medford Street at	NB	0.12	3.7	A	-- / 10	0.06	1.6	A	-- / 4	0.05	1.7	A	0 / 4
		SB	0.3	0.0	A	-- / 0	0.21	0.0	A	-- / 0	0.20	0.0	A	0 / 0
	South Street	EB	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Overall			--	--			--	--			--	--	
4*	Medford Street at	NW	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0
		SE	0	0.0	A	-- / 0	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0
	Warren Street	NE	0.43	16.7	C	-- / 54	0.75	30.2	D	0 / 163	0.57	18.5	C	0 / 88
	Overall			--	--			--	--			--	--	

1 v/c = volume to capacity ratio; 2 Delay = average delay in seconds per vehicle; 3 LOS = Level of Service; 4 Queue = 50th/95th percentile queue length (if only one queue length is shown, it is the 95th percentile queue length), # = volume for 95th percentile cycle exceeds capacity. Queue shown is maximum after two cycles; R = right-turn movement, L = left-turn movement, T = through movement; WB = westbound, EB = eastbound, NB = northbound; * = Unsignalized Intersection

2.3.2 Bicycle Analysis

A bicycle analysis was conducted along each of the study area roadway segments and at each study area intersection using the Bicycle Level of Traffic Stress (BLTS) methodology outlined in Appendix A of the City of Somerville *TIS Guidelines*. The BLTS for each study area roadway and intersection is summarized and shown graphically in Figure 2.3.1.

Roadway Segments

Medford Street (between Somerville Avenue to Warren Street)

There is a dedicated bicycle lane along both sides of Medford Street along this segment. The bicycle lanes on both sides of the roadway are not adjacent to a parking lane. Table 1B was referenced. There is one (1) through lane in each direction, the bicycle lane width including the striped buffer ranges from 6 to 7.5 feet wide, and the speed limit is 25mph. Bicycle Lane blockage is rare. Therefore, the BLTS on Medford Street is an LTS 1.

South Street (between Harding Street and Medford Street)
There are no dedicated bicycle lanes provided on South Street. Table 2 was referenced. There is one (1) total travel lane and a speed limit of 25mph. South Street is a residential street with no pavement markings, therefore, the BLTS is an LTS 1.

In coordination with the Boynton Yards Development, bicycle lanes will be striped on South Street. There will be a bicycle lane in the eastbound direction and a contra flow bicycle lane in the westbound direction not adjacent to parking lanes. Table 1B was referenced. There is one (1) through lane, the bicycle lanes will be 5 feet wide, and the speed limit is 25mph. Therefore, the BLTS will be an LTS 2.

Harding Street (between Ward Street and Porter Street)
There are no dedicated bicycle lanes provided on Harding Street. Table 2 was referenced. There is one (1) total travel lane and a speed limit of 25mph. Harding Street is a residential street with no pavement markings, therefore, the BLTS is an LTS 1.

Bedford Street (between South Street and Porter Street)
There are no dedicated bicycle lanes provided on Bedford Street. Table 2 was referenced. There is one (1) total travel lane and a speed limit of 25mph. Bedford Street is a residential street with no pavement markings, therefore, the BLTS is an LTS 1.

Warren Street (between Jefferson Street and Medford Street)
There are no dedicated bicycle lanes provided in on Warren Street. Therefore, Table 2 was referenced. There is one (1) total travel lane and a speed limit of 25mph. Warren Street is a residential street with no pavement markings, therefore, the BLTS is an LTS 1.

2.3.3 Pedestrian/ADA Analysis

A pedestrian/ADA analysis was conducted along each of the study area roadways, the most logical walking route between the Project site and the closest MBTA subway/light rail station within ½-mile, the most logical walking route between the Project site and the closest bus stop of each route within ¼-mile. The Pedestrian Level of Traffic Stress (PLTS) methodology outlined in Appendix B of the City of Somerville *TIS Guidelines* was referenced. The detailed PLTS tables for the unsignalized crossings are attached in Appendix G.

Roadway Segments
Medford Street (between Warren Street and Somerville Avenue)
There are six sidewalk segments along Medford Street between Warren Street and Somerville Avenue. All segments have a PLTS of 2 except for the northbound segment between opposite Ward Street and 216 McGrath Highway and the southbound segment between Somerville Avenue and the Target side lot, which have a PLTS of 1. The segments of Medford Street are summarized in Table 2.3-3.

Table 2.3-3: Pedestrian Level of Traffic Stress – Medford Street

Medford Street (between Warren Street and Somerville Avenue)						
	Between Warren St & Opposite Ward St (NB)	**Between Opposite Ward St & 216 McGrath Hwy (NB)**	**Between 216 McGrath Hwy & Somerville Ave (NB)**	**Between Somerville Ave & Target Side Lot (SB)**	**Between Target Side Lot & Ward St (SB)**	**Between Ward St & Warren St (SB)**
Table 1						
Actual Width	6.5-8.5'	6-8'	7'	6.5-8.5'	6-8'	8'
Effective Width	≥4'	≥6'	≥5'	≥5'	≥6'	≥4'
Sidewalk Condition	Good	Good	Good	Good	Good	Good
PLTS	*2*	*1*	*2*	*2*	*1*	*2*
Table 1B						
Buffer Type	Solid Surface (Bike Lane)	Vertical (Wall and fence)	Curb Tight	Curb Tight	Vertical (Wall and fence)	Curb Tight
Speed Limit (mph)	25	25	25	25	25	25
PLTS	*2*	*1*	*2*	*2*	*1*	*2*
Table 1C						
Total Travel Lanes	2	2	2	2	2	2
Buffer Width	≥5' to <10'	None (Vertical)	None	≤ 5'	None (Vertical)	≥5' to <10'
PLTS	*2*	*1*	*2*	*2*	*1*	*2*
Overall PLTS	***2***	***1***	***2***	***2***	***1***	***2***

South Street (between Medford Street and Norfolk Street)

The sidewalk segments on both sides of South Street have a PLTS of 2 and are summarized in Table 2.3-4.

Table 2.3-4: Pedestrian Level of Traffic Stress – South Street

South Street (between Medford Street and Windsor Street)		
	Between Medford St & Harding St (WB)	**Between Harding St & Medford St (EB)**
Table 1		
Actual Width	5'	6'
Effective Width	≥2'	≥3'
Sidewalk Condition	Fair	Good
PLTS	*2*	*1*
Table 1B		
Buffer Type	Solid Surface (Bike Lane)	Solid Surface (Bike Lane)
Speed Limit (mph)	25	25
PLTS	*2*	*2*
Table 1C		
Total Travel Lanes	1-2	1-2
Buffer Width	≥5' to <10'	≥5' to <10'
PLTS	*2*	*2*
Overall PLTS	***2***	***2***

Warren Street (between Medford Street and Cambridge Street)

All sidewalk segments on both sides of Warren Street have a PLTS of 2 and are summarized in Table 2.3-5.

Table 2.3-5: Pedestrian Level of Traffic Stress – Warren Street

Warren Street (between Medford Street and Cambridge Street)		
	West Side	**East Side**
Table 1		
Actual Width	7'	7'
Effective Width	≥4'	≥4'
Sidewalk Condition	Good	Good
PLTS	*2*	*2*
Table 1B		
Buffer Type	Vertical (Parking)	Vertical (Parking)
Speed Limit (mph)	25	25
PLTS	*1*	*1*
Table 1C		
Total Travel Lanes	1	1
Buffer Width	≥5' to <10'	≥5' to <10'
PLTS	*2*	*2*
Overall PLTS	***2***	***2***

Bedford Street (between South Street and Porter Street)

There are four sidewalk segments along Bedford Street between South Street and Porter Street. The segments on the west side of the roadway along the 16 South Street parking lot, 2 Bedford Street, and 17 Porter Street on the east side of the roadway have a PLTS of 2. The segment on the east side of the roadway along 20 Bedford Street has a PLTS of 3. All other segments do not have sidewalks and therefore have a PLTS of 4. The segments of Bedford Street are summarized in Table 2.3-6.

Table 2.3-6: Pedestrian Level of Traffic Stress – Bedford Street

Bedford Street (between South Street and Porter Street)						
	Along 16 South St Parking Lot (SB)	**Between 10 Bedford St & 4 Bedford St (SB)**	**Along 2 Bedford St (SB)**	**Along 20 Bedford St (NB)**	**Between 20 Bedford St & 3 Bedford St (NB)**	**Along 17 Porter St (NB)**
Table 1						
Actual Width	5'	N/A	5'	4'	N/A	5'
Effective Width	5'	N/A	5'	4'	N/A	5'
Sidewalk Condition	Fair	No Sidewalk	Good	Good	No Sidewalk	Good
PLTS	*2*	*4*	*2*	*3*	*4*	*2*
Table 1B						
Buffer Type	Curb Tight	N/A	Curb Tight	Curb Tight	N/A	Curb Tight
Speed Limit (mph)	25	25	25	25	25	25
PLTS	*2*	*4*	*2*	*2*	*4*	*2*
Table 1C						
Total Travel Lanes	2	2	2	2	2	2
Buffer Width	≥5' to <10'	N/A	≥5' to <10'	≤5'	N/A	≥5' to <10'
PLTS	*2*	*4*	*2*	*2*	*4*	*2*
Overall PLTS	***2***	***4***	***2***	***3***	***4***	***2***

Harding Street (between Ward Street and Porter Street)

There are four sidewalk segments along Harding Street between Ward Street and Porter Street. The segment on the west side of the roadway between Ward Street and South Street, and the segment on the east side between Ward St and 34 South Street have a PLTS of 3. The segment on the west side of the roadway between South Street and Porter Street, and the segment on the east side between 34 South Street and Porter Street have a PLTS of 2. The segments of Harding Street are summarized in Table 2.3-7.

Table 2.3-7: Pedestrian Level of Traffic Stress – Harding Street

Harding Street (between Ward Street and Porter Street)				
	Between Ward St & South St (West Side)	**Between South St & Porter St (West Side)**	**Between Ward St & South St (East Side)**	**Between South St & Porter St (East St)**
Table 1				
Actual Width	4'	5'	4'	6'
Effective Width	≥ 2'	≥ 5'	4'	≥ 3'
Sidewalk Condition	Fair	Good	Good	Fair
PLTS	*3*	*2*	*3*	*2*
Table 1B				
Buffer Type	Vertical (Parking)	Vertical (Parking)	Curb Tight	Vertical (Parking)
Speed Limit (mph)	25	25	25	25
PLTS	*1*	*1*	*2*	*1*
Table 1C				
Total Travel Lanes	1	1	1	1
Buffer Width	≤ 5'	≥5' to <10'	≤ 5'	≤ 5'
PLTS	*2*	*2*	*2*	*2*
Overall PLTS	***3***	***2***	***3***	***2***

Unsignalized Intersection Crossings

Crosswalk Across Warren Street

The unsignalized crosswalk across Warren Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Warren Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across Medford Street south of South Street

The unsignalized crosswalk across Medford Street does not have a median refuge island and has two lanes to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps, RRFBs, and Medford Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across South Street at Medford Street

The unsignalized crosswalk across South Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps, a concrete rumble area and painted pedestrian bump out, and South Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across Ward Street at Medford Street

The unsignalized crosswalk across Ward Street does not have a median refuge island and has only two lanes to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Ward Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across Medford Street South of Ward Street
The unsignalized crosswalk across Medford Street does not have a median refuge island and has two lanes to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Medford Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 3.

Crosswalk Across Porter Street at Warren Street
The unsignalized crosswalk across Porter Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Porter Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across Jefferson Street at Warren Street
The unsignalized crosswalk across Jefferson Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Jefferson Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across Bedford Street at South Street
The unsignalized crosswalk across Bedford Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Bedford Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across Bedford Street at Porter Street
The unsignalized crosswalk across Bedford Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Bedford Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Crosswalk Across Horace Street at South Street
The unsignalized crosswalk across Horace Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two non-compliant ADA ramps which are missing tactile warning pads and Horace Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 3.

Crosswalk Across Harding Street North of South Street
The unsignalized crosswalk across Harding Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two non-compliant ADA ramps which are missing tactile warning pads and Harding Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 3.

Crosswalk Across Harding Street South of South Street
The unsignalized crosswalk across Harding Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two non-compliant ADA ramps which are missing tactile warning pads and Harding Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 3.

Crosswalk Across Porter Street at Harding Street
The unsignalized crosswalk across Porter Street does not have a median refuge island and has only one lane to cross, therefore only Table 2A was referenced. The crosswalk has two compliant ADA ramps and Porter Street has a speed limit of 25 miles per hour. Therefore, the crossing has a PLTS of 1.

Routes to MBTA Rapid Transit Stations and Bus Stops
Fastest Route to Union Square Station (Future Green Line Station)
The fastest route to the future Union Square Station from the Project site is via Medford Street and Somerville Avenue. Along Medford Street north of the Project Site, the west side of the roadway has a PLTS of 2. Pedestrians can cross Prospect Street at the signalized intersection of Prospect Street at Webster Avenue and Concord Street. Therefore, the fastest route has an overall PLTS of 2.

Fastest Route to East Somerville Station (Future Green Line Station)
The fastest route to the future Union Square Station from the Project site is via Medford Street. Along Prospect Street north of the Project Site, the west side of the roadway has a PLTS of 2. Pedestrians can cross Prospect Street at the signalized intersection of Prospect Street at Webster Avenue and Concord Street. Therefore, the fastest route has an overall PLTS of 2.

Fastest Route to MBTA Bus Stops
The fastest route to the bus stops for route 69 inbound and outbound is via Medford Street and Warren Street. The south side of Medford Street between the Project Site and Warren Street and the east side of Warren Street have a PLTS of 2. Pedestrians can cross Warren Street at the unsignalized intersection of Warren Street at Medford Street which has a PLTS of 1. Therefore, the fastest routes to inbound and outbound bus route 69 have a PLTS of 2.

The fastest route to the bus stops for route 80, 87, and 88 inbound and outbound is via Medford Street. The west side of Medford Street between the Project Site and Somerville Avenue has a maximum PLTS of 2. Pedestrians can cross Somerville Avenue and McGrath Highway at the signalized intersection of Medford Street at Somerville Avenue McGrath Highway. Therefore, the fastest routes to inbound and outbound bus routes 80, 87, and 88 have a PLTS of 2.

2.3.4 Transit Analysis

The Project site is located within ½-mile of both MBTA bus stops and two (2) future rapid transit stations. The walking travel time and distance to the closest station, average wait time for each service, are summarized in Tables 2.3-15 and 2.3-16. The conditions of each of the closest bus stops and the future Green Line station are described in Section 2.2.5. A summary of schedules and headways for each service is shown in Table 2.3-17 and boarding and alighting information for each bus stop is shown in Table 2.3-18.

Table 2.3-15: Transit Analysis Summary - Inbound

	MBTA Bus Routes (Inbound)			
	69	80, 87, & 88	85	86, 91, & CT2
Distance to Closest Stop (Miles)	0.2	0.3	0.5	0.5
Walk Travel Time to Closest Stop (Minutes)	5	7	10	10
Average Wait Time (Minutes)	6.25 (AM Peak) 10 (PM Peak) 11 (Saturday)	9 to 12.5 (AM) 10 to 22.5 (PM) 12.5 to 17.5 (Saturday)	12.5 to 27.5 (AM) 22.5 to 25 (PM) N/A (Saturday)	10 to 12.5 (AM) 12.5 to 20 (PM) 17.5 to 22.5 (Saturday)

Table 2.3-16: Transit Analysis Summary - Outbound

	MBTA Bus Routes (Outbound)			
	69	80, 87, & 88	85	86, 91, & CT2
Distance to Closest Stop (Miles)	0.2	0.2	0.5	0.4
Walk Travel Time to Closest Stop (Minutes)	5	5	10	8
Average Wait Time (Minutes)	6.25 (AM Peak) 10 (PM Peak) 11 (Saturday)	9 to 12.5 (AM Peak) 10 to 14 (PM Peak) 12.5 to 17.5 (Saturday)	20 to 25 (AM Peak) 27.5 to 25 (PM Peak) N/A (Saturday)	12.5 to 15 (AM Peak) 12.5 to 20 (PM Peak) 17.5 to 22.5 (Saturday)

Table 2.3-17: Schedules and Headways Summary

Bus Route	Origin/Destination	Time Period	Inbound Headways (minutes)	Outbound Headways (minutes)
69	Avon Street/Central Street to Kendall Square Station	AM Peak PM Peak Saturday	10-15 20 22	10-15 20 22
80	Arlington Center to Lechmere Station	AM Peak PM Peak Saturday	25 25-35 35	25 25-30 35
85	Spring Hill to Kendall/MIT Station	AM Peak PM Peak Saturday	25-55 45-50 N/A	40-50 45-50 N/A
86	Sullivan Station to Cleveland Circle	AM Peak PM Peak Saturday	25 25 35	25 25-30 35
87	Clarendon Hill/Arlington Center to Lechmere Station	AM Peak PM Peak Saturday	15-20 20 25	15-20 20 25
88	Clarendon Hill to Lechmere Station	AM Peak PM Peak Saturday	15-20 20-25 25	15-20 20 25
91	Clarendon Hill to Lechmere Station	AM Peak PM Peak Saturday	25 25 45	25 25 45
CT2	Clarendon Hill to Lechmere Station	AM Peak PM Peak Saturday	20 40 N/A	25-30 40 N/A

Table 2.3-18: Boarding and Alighting Summary (Fall 2019*)

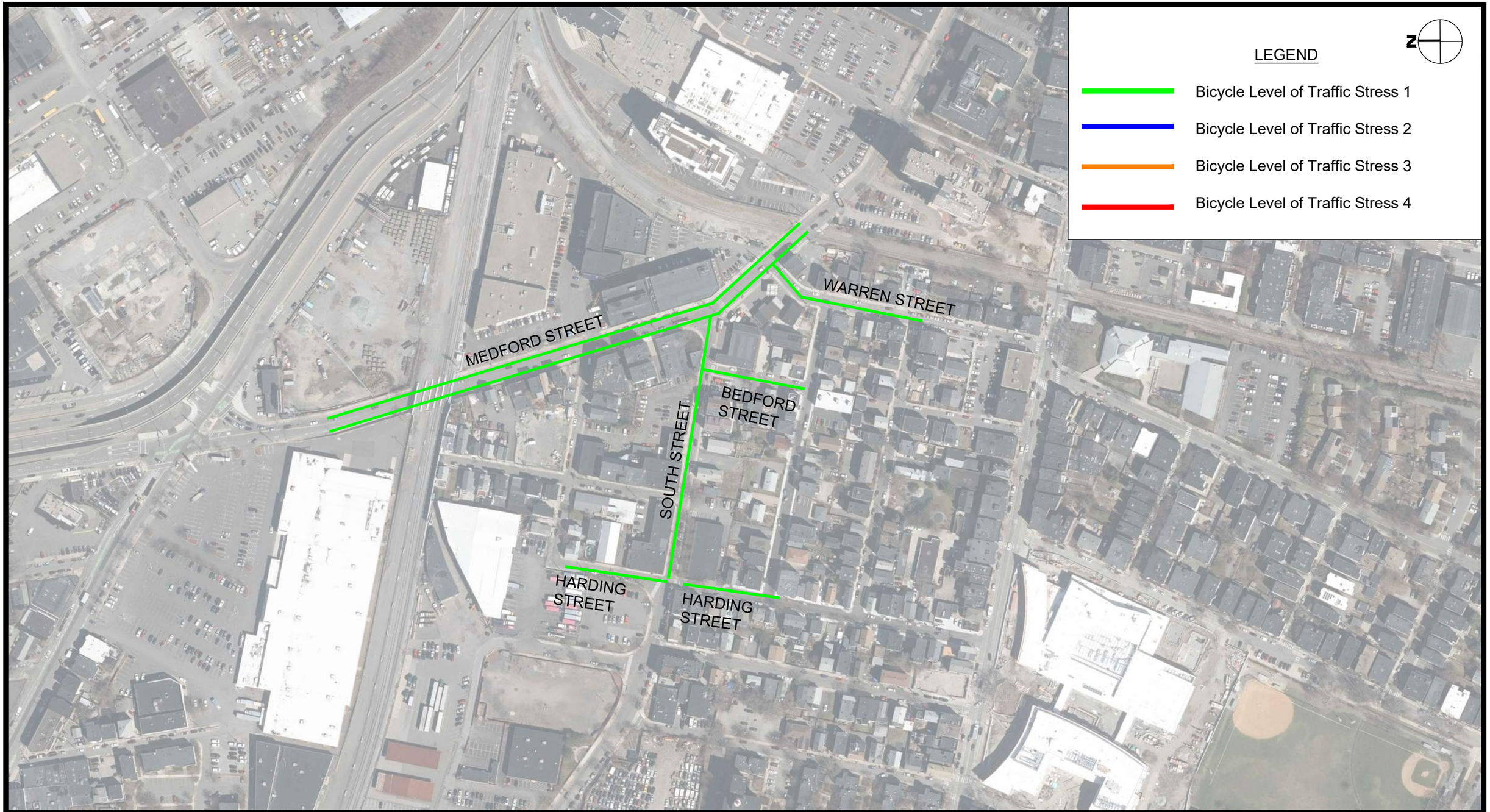
Bus Route	Origin/Destination	Bus Stop	Time Period	Total Passengers Boarding	Total Passengers Alighting
69 (Inbound)	Harvard Square to Lechmere Station	Cambridge Street @ Max Avenue	AM Peak	12	12
			PM Peak	6	22
			Weekday Daily	41	93
			Saturday	27	62
69 (Outbound)	Lechmere Station to Harvard Square	Cambridge Street @ Lambert Street	AM Peak	24	7
			PM Peak	22	14
			Weekday Daily	115	49
			Saturday	81	27
80 (Inbound)	Arlington Center to Lechmere Station	McGrath Highway @ Medford Street	AM Peak	3	7
			PM Peak	3	3
			Weekday Daily	19	26
			Saturday	12	18
80 (Outbound)	Lechmere Station to Arlington Center	McGrath Highway @ Poplar Street	AM Peak	3	0
			PM Peak	4	3
			Weekday Daily	20	12
			Saturday	15	9
85 (Inbound)	Spring Hill to Kendall/MIT Station	Webster Avenue @ Norfolk Street	AM Peak	5	1
			PM Peak	0	0
			Weekday Daily	2	1
			Saturday	0	0
85 (Outbound)	Kendall/MIT Station to Spring Hill	Webster Avenue @ Columbia Street	AM Peak	0	0
			PM Peak	0	0
			Weekday Daily	1	5
			Saturday	0	0
86 (Inbound)	Sillivan Station to Cleveland Circle	Medford Street @ Washington Street	AM Peak	N/A	N/A
			PM Peak	N/A	N/A
			Weekday Daily	N/A	N/A
			Saturday	N/A	N/A
86 (Outbound)	Clevelan Circle to Sullivant Station	Washington Street @ McGrath Highway	AM Peak	N/A	N/A
			PM Peak	N/A	N/A
			Weekday Daily	N/A	N/A
			Saturday	N/A	N/A

N/A = Bus stop was not serviced by this route in Fall 2019

Table 2.3-18: Boarding and Alighting Summary Continued (Fall 2019*)

Bus Route	Origin/Destination	Bus Stop	Time Period	Total Passengers Boarding	Total Passengers Alighting
87 (Inbound)	Clarendon Hill/Arlington Center to Lechmere Station	McGrath Highway @ Medford Street	AM Peak	9	4
			PM Peak	4	2
			Weekday Daily	18	12
			Saturday	22	3
87 (Outbound)	Lechmere Station to Clarendon Hill/Arlington Center	McGrath Highway @ Poplar Street	AM Peak	1	3
			PM Peak	4	6
			Weekday Daily	9	10
			Saturday	8	17
88 (Inbound)	Clarendon Hill to Lechmere Station	McGrath Highway @ Medford Street	AM Peak	11	5
			PM Peak	5	6
			Weekday Daily	16	25
			Saturday	21	29
88 (Outbound)	Lechmere Station to Clarendon Hill	McGrath Highway @ Poplar Street	AM Peak	2	2
			PM Peak	8	11
			Weekday Daily	19	23
			Saturday	27	23
91 (Inbound)	Central Square to Sullivan Station	*Washington Street @ Boston Street	AM Peak	7	2
			PM Peak	5	1
			Weekday Daily	22	18
			Saturday	35	33
91 (Outbound)	Sullivan Station to Central Square	Washingston Street @ McGrath Highway	AM Peak	6	1
			PM Peak	1	6
			Weekday Daily	17	16
			Saturday	32	19
CT2 (Inbound)	Sullivan Station to Ruggles Station	*Washington Street @ Boston Street	AM Peak	34	3
			PM Peak	1	3
			Weekday Daily	28	19
			Saturday	0	0
CT2 (Outbound)	Ruggles Station to Sullivan Station	Washington Street @ McGrath Highway	AM Peak	8	1
			PM Peak	4	20
			Weekday Daily	18	15
			Saturday	0	0

* = Inbound bus service now located at the Medford Street at Washington Street bus stop



Design Consultants Inc.
Somerville - South Shore
www.dci-ma.com

DEVELOPER:
SOMERVILLE LIVING, LLC
P.O. BOX 780
LYNNFIELD, MA 01940

PROJECT TEAM

THE ONYX
16-20 MEDFORD STREET
SOMERVILLE, MA

SITE NAME/ADDRESS

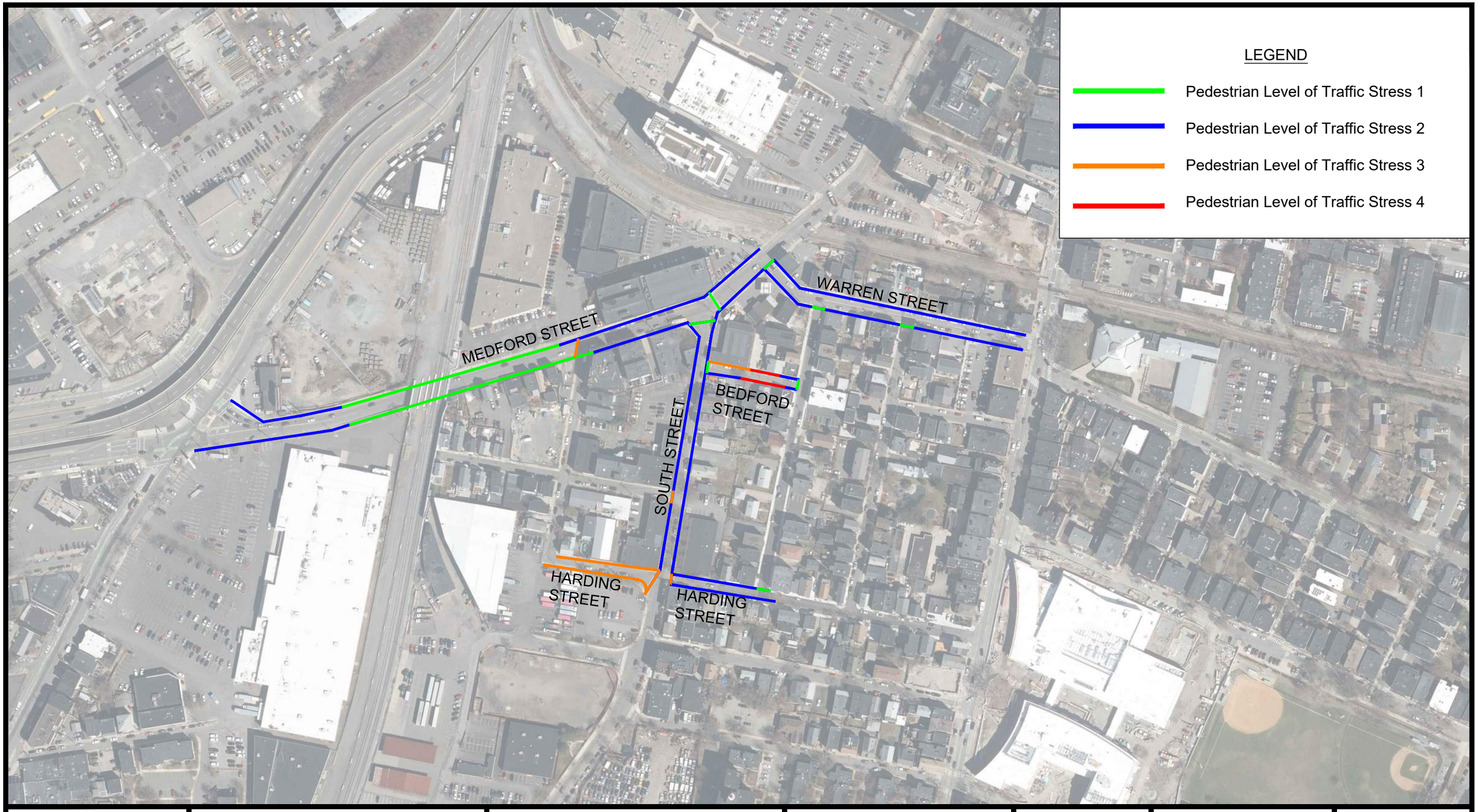
Bicycle Level of Traffic Stress

SHEET NAME

Figure 2.3.1

SHEET #

DR BY: LV
CHK BY: SGS
DCI PROJ NO: 2021-024
DATE: JANUARY 2022
SCALE: 1" = 200'



Design Consultants Inc.
Somerville - South Shore
www.dci-ma.com

DEVELOPER:
SOMERVILLE LIVING, LLC
P.O. BOX 780
LYNNFIELD, MA 01940

PROJECT TEAM

THE ONYX
16-20 MEDFORD STREET
SOMERVILLE, MA

SITE NAME/ADDRESS

Pedestrian Level of Traffic Stress

SHEET NAME

Figure 2.3.2

SHEET #

DR BY: LV

CHK BY: SGS

DCI PROJ NO: 2021-024

DATE: JANUARY 2022

SCALE: 1" = 200'

3. FUTURE TRANSPORTATION ANALYSIS

Future vehicle, pedestrian, bicycle, and transit operations were analyzed for the following condition, as specified by the City of Somerville:

- 2022 Build Conditions: Existing conditions plus project-generated traffic, with South Street reversed from westbound to eastbound travel.

3.1 Build Conditions

3.1.1 Project Traffic

The trip generation was calculated in the TIS Study Scope letter submitted to the City of Somerville in October 2021. The trips were calculated for 41 residential units and 3,876 square feet of first floor retail. Since that time, the plans have been updated to reduce the amount of first-floor retail by approximately 376 square feet. The updated trip generation is calculated in the subsequent sections.

The Project will be comprised of 41 residential dwelling units and approximately 3,500 square feet of first floor retail. The *Trip Generation Manual, 10th Edition*, published by the Institute of Transportation Engineers (ITE) in 2017, categorizes this land uses and provides unadjusted vehicle-trip estimates for Weekday AM, Weekday PM, and Saturday Midday peak hours, as well as a Weekday. Land use codes (LUC) 221 – Multifamily Housing (Mid-Rise) and LUC 932 – High-Turnover (Sit-Down) Restaurant were used for the trip generation calculations for the residential dwelling units and first-floor retail, respectively. Table 3.1-1 shows the number of trips estimated for the 41 residential dwelling units and Table 3.1-2 shows the number of trips estimated for the first-floor retail space.

Table 3.1-1: Residential Trip Generation Calculations (Per ITE)

Land Use Code: 221	Multifamily Housing (Mid-Rise)			
	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday Daily	Sat. Midday Peak Hour
Size per # of Dwelling Units (X)	41	41	41	41
Fitted Curve Equation (per ITE)	Ln(T) = 0.98* Ln(X) - 0.98	Ln(T) = 0.96* Ln(X) - 0.63	T = 5.45(X) - 1.75	T = 0.42(X) + 6.73
Total Trips (T)	**14**	**19**	**222**	**23**
Entering%	26%	61%	50%	49%
Exiting%	74%	39%	50%	51%
Entering Trips	4	12	111	11
Exiting Trips	10	7	111	12

Table 3.1-2: Retail Trip Generation Calculations (Per ITE)

Land Use Code: 932	High-Turnover (Sit-Down) Restaurant			
	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday Daily	Sat. Midday Peak Hour
Size per 1,000 Square Feet	3.500	3.500	3.500	3.500
Average Trip Rate	9.94	9.77	112.18	11.19
Total Trips	**35**	**34**	**392**	**39**
Entering%	55%	62%	50%	51%
Exiting%	45%	38%	50%	49%
Entering Trips	19	21	196	20
Exiting Trips	16	13	196	19

As shown in Table 3.1-1, the proposed residential dwelling units are expected to generate approximately 14 trips during the Weekday AM peak hour, 19 trips during the Weekday PM peak hour, 222 trips during a typical weekday, and 23 trips during the Saturday Midday peak hour. As shown in Table 3.1-2, the retail space is expected to generate approximately 35 trips during the Weekday AM peak hour, 34 trips during the Weekday PM peak hour, 392 trips during a typical weekday, and 39 trips during the Saturday Midday peak hour. To account for location-specific travel mode trends, non-vehicular trips will be deducted in the subsequent section.

3.1.2 Travel Mode Shares

Trip Generation rates set forth by the ITE are typically based on data from suburban developments with no nearby transit service and no appreciable share of people walking or bicycling to or from the site. If a project is in an area with transit service or a substantial share of trips are made by bicycle or on foot, these non-vehicle trips should be estimated and deducted to get the predicted vehicle volume. The proposed Project is located in Census Tract 3515.

Commuting characteristics were analyzed from the 2015 to 2019 American Community Survey 5-Year Estimates. Tables 3.1-1 and 3.1-2 display estimated mode splits for non-vehicle trips and the land use associated with each trip. Based on the collected data, an average of 37.4% of residents use a vehicle, 26.2% of residents use public transportation, 12.7% of residents bike, 14.1% of residents walk, 7.6% off residents worked from home, and 2.1% of residents commute via other means to work. Table 3.1-3 shows the US Census mode share data used.

Table 3.1-3: Mode Split Percentages

MEANS OF TRANSPORTATION TO WORK	Census Tract 3515	**Percentage (Used for Residential)**	**Percentage (Used for Retail)**
Car, truck, or van	37.4%	**38.2%**	**41.4%**
Drove alone	29.0%	**29.6%**	**32.1%**
Carpooled:	8.4%	**8.6%**	**9.3%**
In 2-person carpool	8.4%	**8.6%**	**9.3%**
In 3-person carpool	0.0%	**0.0%**	**0.0%**
In 4 person carpool	0.0%	**0.0%**	**0.0%**
Public transportation	26.2%	**26.8%**	**0.0%**
Bicycle	12.7%	**13.0%**	**14.0%**
Walked	14.1%	**14.4%**	**44.6%**
Worked from home	7.6%	**7.6%**	**0.0%**
Other means	2.1%	**0.0%**	**0.0%**

3.1.3 Adjusted Trips

As described above, adjustments were made to the base trips taking into account the US Census Tract data. The *ITE Trip Generation Handbook, 3rd Edition* includes an Average Vehicle Occupancy (AVO) of 1.1 for residential buildings. Based on the average modal split data above, an AVO rate of 1.145 persons per vehicle was calculated for the residential units. The number of trips were adjusted using the AVO and census tract modal split data. By applying the non-vehicular mode split to the Trip Generation calculations, the amount of expected vehicle traffic associated with the Project is reduced. Given the likely use of the retail space, it is expected that many of the trips will be made via walking and will serve either the residents of the building or the local population. The resulting adjusted vehicular traffic on the surrounding roadways was estimated and are summarized in Table 3.1-4.

Table 3.1-4: Adjusted Mixed-Use Trips

Mixed-Use Development	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday Daily	Sat. Midday Peak Hour
Base Trips (per ITE)	49	53	613	62
Total Person-Trips	50	55	635	64
Total Person-Vehicle-Trips	20	22	255	26
Total Vehicle-Trips	**17**	**18**	**208**	**21**
Entering Vehicle-Trips	8	11	104	11
Exiting Vehicle-Trips	9	7	104	10
Total Non-Vehicular Trips	30	33	380	38

As shown in Table 3.1-4, the Project is expected to generate **17 vehicle-trips** during the Weekday AM peak hour, **18 vehicle-trips** during the Weekday PM peak hour, **208 vehicle-trips** during a typical weekday, and **21 vehicle-trips** during the Saturday Midday peak hour. This equates to approximately one (1) vehicle-trip every three (3) minutes during the Weekday AM peak hour, Weekday PM peak hour, and Saturday Midday peak hour. The number of vehicle-trips are expected to decrease in the future with the opening of the relocated East Somerville Station as

part of the Green Line Extension providing rapid rail transit access from East Somerville to Somerville and Medford as well as downtown Boston.

3.1.4 Existing Trip Generation

Although the existing site land uses are no longer in operation effective April 2021, understanding the number of vehicle-trips that the previous site generated is important to note. 16 Medford Street was the former Somerville Gas & Service Station and 20 Medford Street was the former Cubby Oil headquarters. The 16 Medford Street gas station provided four (4) gasoline pumping stations, an autobody repair shop, and a Massachusetts Vehicle Inspection location. 20 Medford Street housed the corporate office to Cubby Oil, all its crude oil tankers/trucks, repair trucks, and other heating and cooling equipment.

Table 3.1-5: Existing Site Vehicle-Trips

Land Use Code: 944	Fueling Station			
	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday Daily	Sat. Midday Peak Hour
Number of Fueling Station	4.000	4.000	4.000	4.000
Average Trip Rate	10.28	14.03	172.01	12.77
Total Trips	**42**	**56**	**688**	**52**
Entering%	50%	50%	50%	50%
Exiting%	50%	50%	50%	50%
Entering Trips	21	28	344	26
Exiting Trips	21	28	344	26

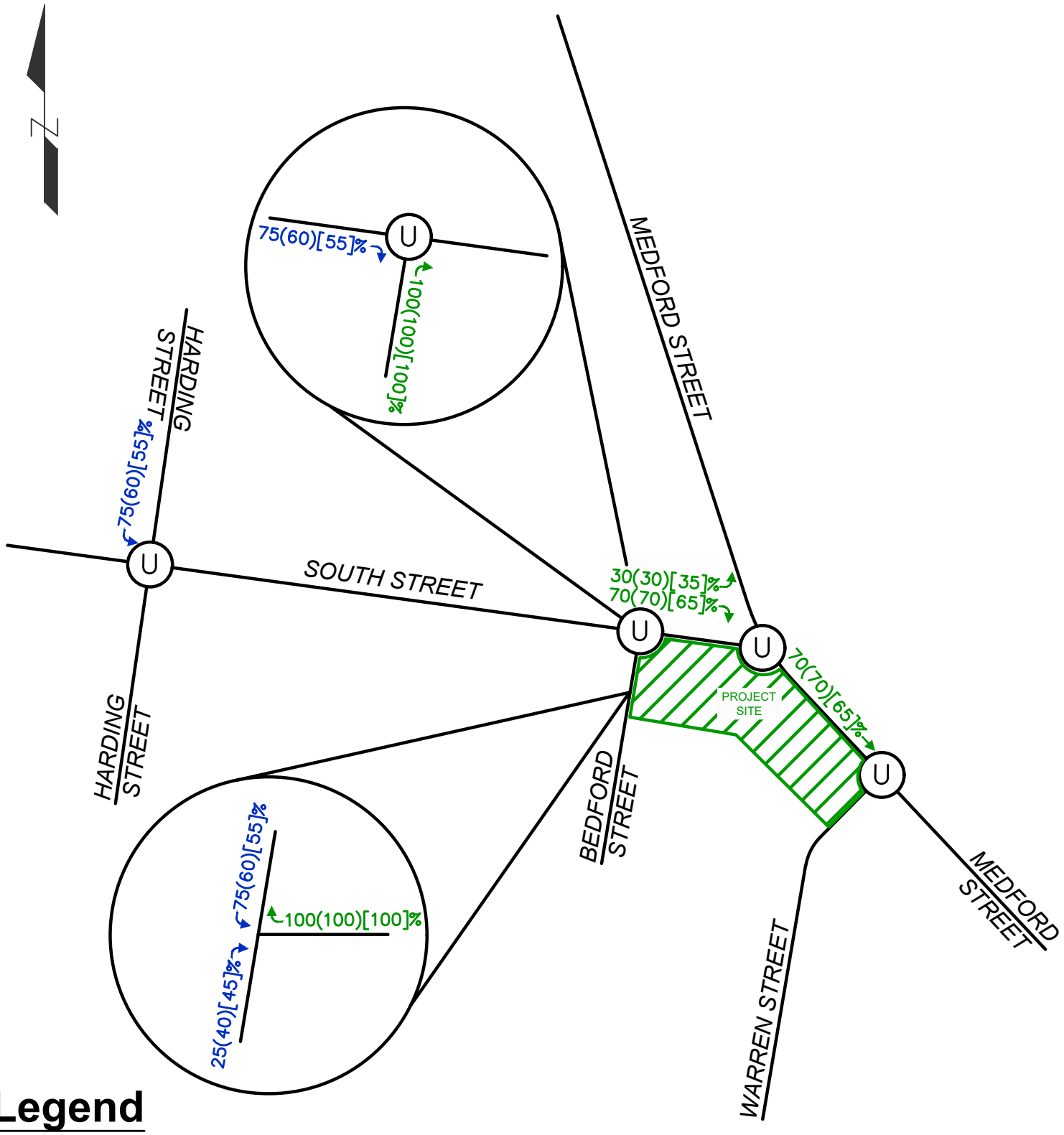
As shown in Table 3.1-5, it is estimated that the previous site generated 42 vehicle-trips during the Weekday AM peak hour, 56 vehicle-trips during the Weekday PM peak hour, 688 vehicle-trips during a typical weekday, and 52 vehicle-trips during the Saturday Midday peak hour. Therefore, it is estimated that the Project will generate *24 fewer vehicle-trips* during the Weekday AM peak hour, *37 fewer vehicle-trips* during the Weekday PM peak hour, *466 fewer vehicle-trips* during a typical weekday, and *30 fewer vehicle-trips* during the Saturday Midday peak hour. Additionally, the site had 5-10 office staff on-site commuting mostly by motor vehicle. The site also produced a high number of heavy vehicle trips. Overall, the proposed Project should generate significantly less vehicle activity than the former land uses.

3.1.5 Project Trip Distribution

Trip distribution patterns were estimated for site-generated vehicle-trips both to and from the Project site and study area. After the development of the site, residential and retail vehicle-trips to and from the site will be able to enter and exit the site via the site driveway on Bedford Street.

Trip distribution patterns were estimated for site-generated vehicle-trips both to and from the Project site based mainly on the 2011-2015 5-year ACS Commuting Flows, turning movement count (TMC) data, and the most logical route to the project site driveway. The trip distribution was shown in the approved Mobility Management Plan.

The peak hour trip distributions are shown in Figure 3.1.1 and the site-generated vehicle-trips are shown in Figure 3.1.2. The site-generated vehicle-trips were combined with the Existing conditions traffic volumes, which were adjusted to account for the reverse of South Street from westbound to eastbound travel, to calculate the 2022 Build Conditions traffic volumes used for future analysis and are shown in Figures 3.1.3 to 3.1.5. The volumes adjusted to account for the change in direction of travel on South Street as well as the assumptions made are included in Appendix D.



Legend

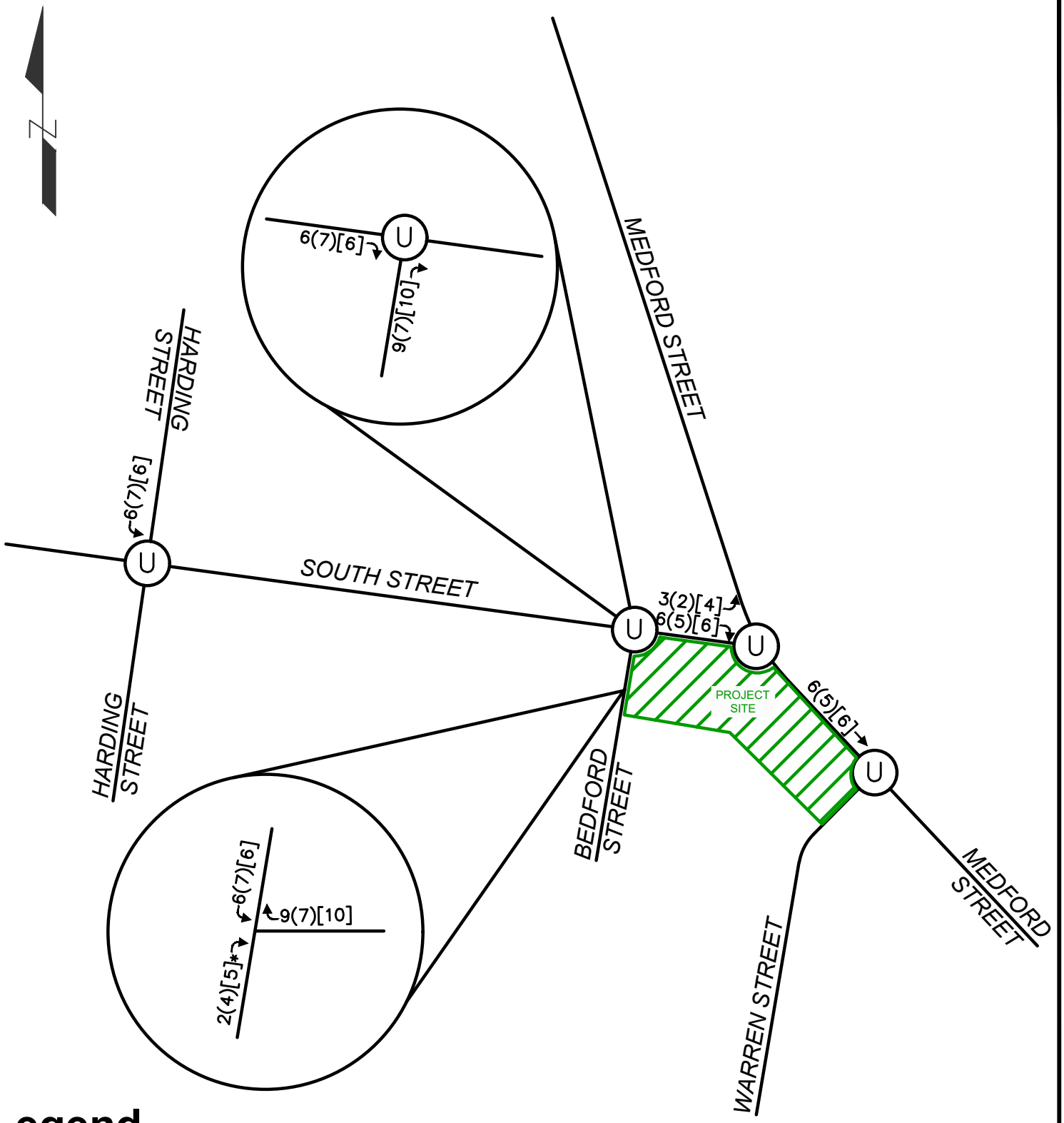
XX(YY)[ZZ]% → Weekday AM(Weekday PM)[Saturday Midday] Peak Hour Trip Distribution - Entering Vehicle-Trips

XX(YY)[ZZ]% → Weekday AM(Weekday PM)[Saturday Midday] Peak Hour Trip Distribution - Exiting Vehicle-Trips

S = Signalized Intersection; U = Unsignalized Intersection

P:\2021 PROJECTS\2021-024 20 MEDFORD ST SOMERVILLE_TRAFFIC\TRANSPORTATION IMPACT STUDY\CAD\20 MEDFORD STREET_TRAFFIC FIGURES.DWG

DCI Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	Peak Hour Trip Distribution	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 3.1.1



Legend

XX(YY) → Weekday AM(Weekday PM)[Saturday Midday] Peak Hour Site-Generated Vehicle-Trips

*Trips from Boston, Cambridge and points west will likely travel along Harding Street turn right on Porter Street, turn left on Bedford Street, then turn right into the site.

S = Signalized Intersection; U = Unsignalized Intersection

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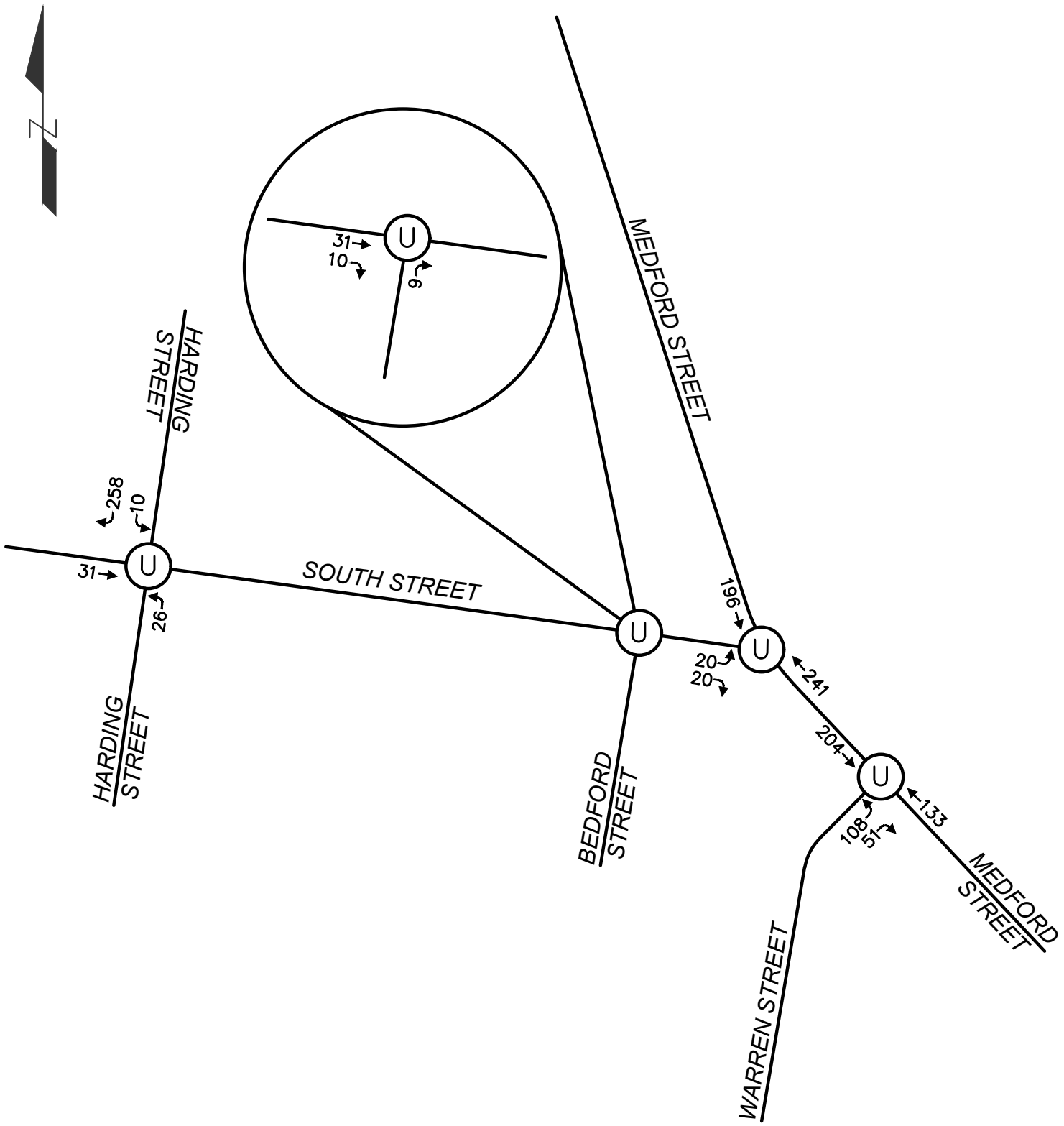
DCI Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	Peak Hour Site-Generated Vehicle-Trips	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 3.1.2



Legend

XX → 2022 Build Weekday AM Peak Hour Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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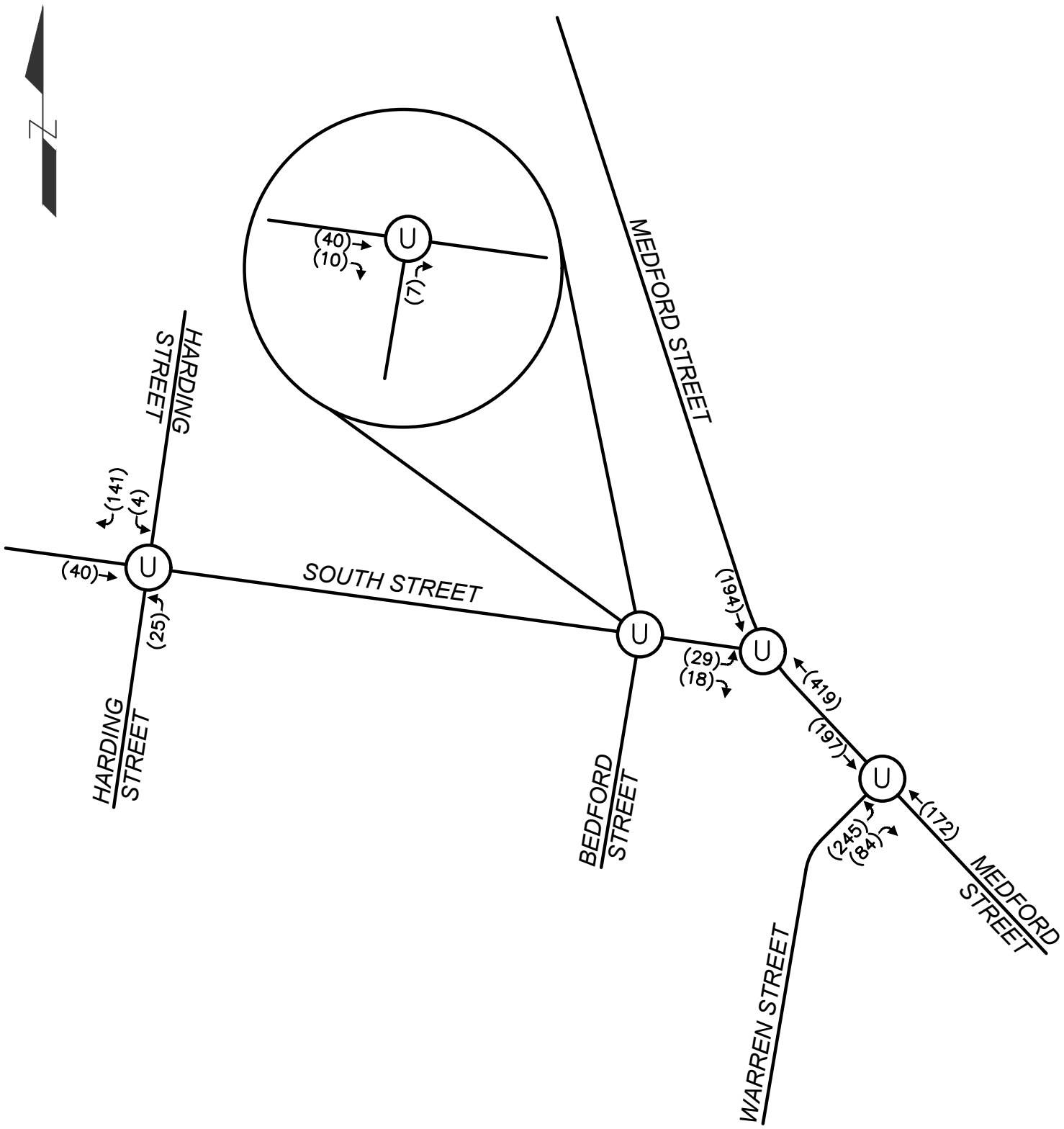
DCI Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Build Weekday AM Peak Hour Vehicle-Trips	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 3.1.3



Legend

(YY) → 2022 Build Weekday PM Peak Hour Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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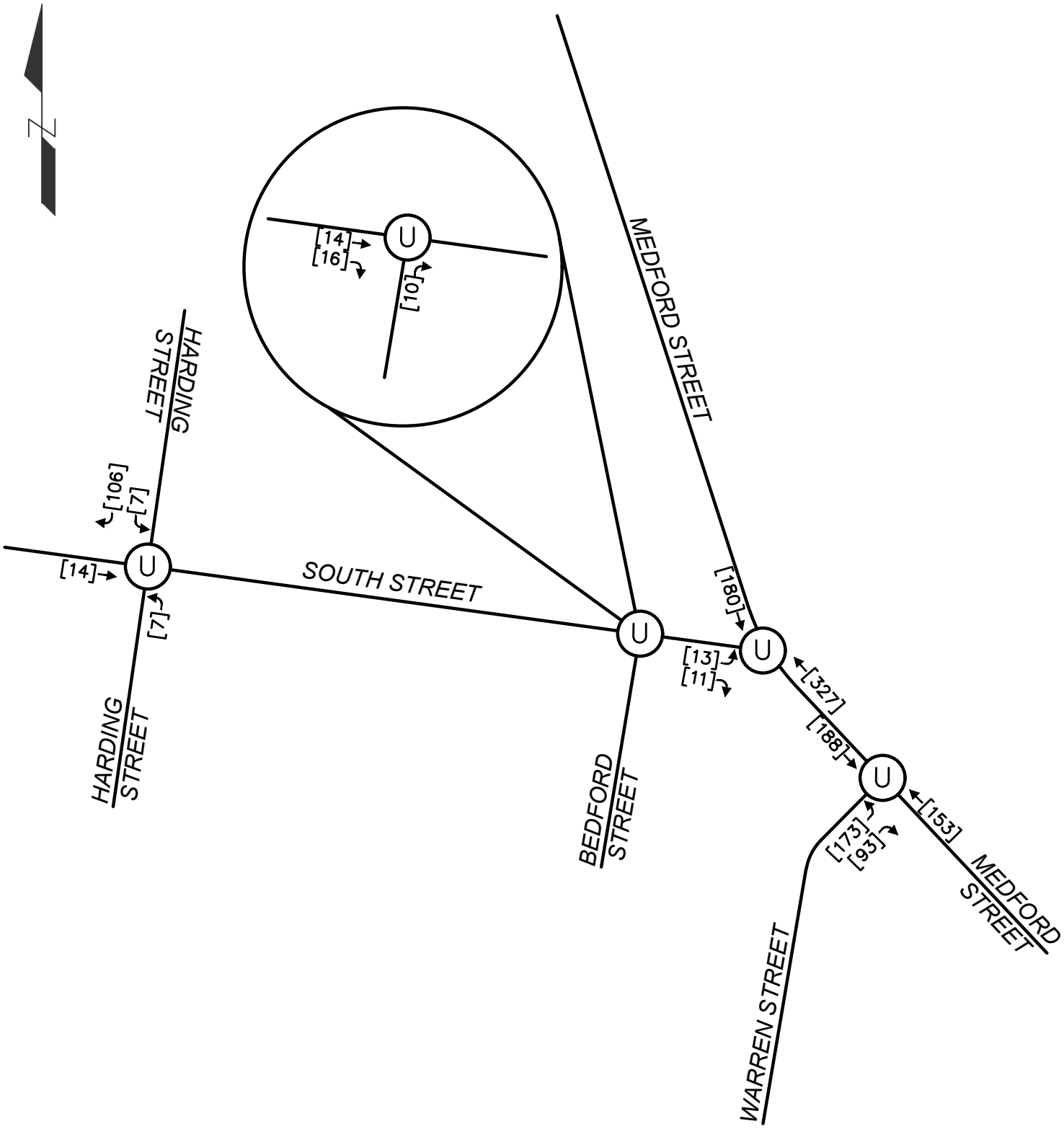
DCi Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Build Weekday PM Peak Hour Vehicle-Trips	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 3.1.4



Legend

[ZZ] → 2022 Build Saturday Midday Peak Hour Traffic Volumes

Note: Imbalances due to numerous side streets, parking areas, and curb cuts not shown
S = Signalized Intersection; U = Unsignalized Intersection

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DCi Design Consultants Inc. Somerville - South Shore www.dci-ma.com	16-20 MEDFORD STREET SOMERVILLE, MA	2022 Build Saturday Midday Peak Hour Vehicle-Trips	DCI PROJECT NO.: 2021-024
			DATE: JANUARY 2022
			SCALE: N.T.S. Figure 3.1.5

3.1.6 2022 Build Conditions Vehicle Analysis

The study intersections were analyzed for Build Conditions peak hour traffic during the Weekday AM, Weekday PM, and Saturday Midday peak hours. For the intersection of Medford Street at Warren Street, existing traffic control and lane configuration was maintained during the Build Conditions analysis. For all other study intersections, traffic control and lane configurations were modeled to account for the re-orientation of South Street in the Build Condition. The results of this analysis are shown in Table 3.1-6. Compared with Table 2.3-2 in Section 2.3, Table 3.1-6 illustrates minimal changes in delay. The changes in level of service along certain approaches can be attributed to the expected redistribution of existing volumes due to the future change in direction of travel of South Street. While some movements and intersections experience an incremental increase in delay due to the project trips and redistribution of existing volumes, there are also some movements and intersections that are expected to experience an improvement in level of service and decreases in delays.

As such, no additional mitigation is warranted to accommodate the proposed vehicle-trips. Detailed capacity analysis worksheets are included in Appendix E.

Table 3.1-6: 2022 Build Conditions Level of Service

ID	Roadway	Movement	2022 Existing Conditions											
			Weekday AM Peak Hour				Weekday PM Peak Hour				Saturday Midday Peak Hour			
			v/c[1]	Delay[2]	LOS[3]	Queue[4]	v/c[1]	Delay[2]	LOS[3]	Queue[4]	v/c[1]	Delay[2]	LOS[3]	Queue[4]
1*	South Street at	EB	0.02	0.0	A	-- / 0	0.03	0.0	A	-- / 0	0.01	0.0	A	-- / 0
	Harding Street	NB	0.13	20.9	C	-- / 11	0.06	11.9	B	-- / 5	0.02	10.7	B	-- / 2
		SB	0.44	10.9	B	-- / 57	0.18	9.1	A	-- / 16	0.15	8.9	A	-- / 14
	Overall			--	--			--	--			--	--	
2*	South Street at	EB	0.03	0.0	A	-- / 0	0.03	0.0	A	-- / 0	0.02	0.0	A	-- / 0
	Bedford Street	NB	0.01	8.6	A	-- / 1	0.01	8.7	A	-- / 1	0.01	8.5	A	-- / 1
	Overall			--	--			--	--			--	--	
3*	Medford Street at	NB	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0
		SB	0.13	0.0	A	-- / 0	0.13	0.0	A	-- / 0	0.13	0.0	A	-- / 0
	South Street	EB	0.08	12.2	B	-- / 7	0.12	14.8	B	-- / 10	0.05	12.2	B	-- / 4
	Overall			--	--			--	--			--	--	
4*	Medford Street at	NW	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0
		SE	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0	0.00	0.0	A	-- / 0
	Warren Street	NE	0.31	13.8	B	-- / 31	0.66	23.6	C	0 / 119	0.49	16.2	C	0 / 68
	Overall			--	--			--	--			--	--	

1 v/c = volume to capacity ratio; 2 Delay = average delay in seconds per vehicle; 3 LOS = Level of Service; 4 Queue = 50th/95th percentile queue length (if only one queue length is shown, it is the 95th percentile queue length), # = volume for 95th percentile cycle exceeds capacity. Queue shown is maximum after two cycles; R = right-turn movement, L = left-turn movement, T = through movement; WB = westbound, EB = eastbound, NB = northbound; * = Unsignalized Intersection

3.1.7 2022 Build Conditions Pedestrian and Bicycle Analysis

The pedestrian facilities along Medford Street, South Street, Harding Street, Bedford Street and Warren Street are not expected to change. As such, there is no pedestrian analysis needed.

When South Street between Medford Street and Harding Street one-way direction of travel is reversed from westbound to eastbound, a bicycle lane will be striped in the eastbound direction and a contra-flow bicycle lane will be striped in the westbound direction. In the existing conditions bicycle analysis, it was determined that the BLTS on South Street is an LTS 1. In the future condition, there will be a dedicated bicycle lane along both sides of South Street along this segment. The bicycle lanes on both sides of the roadway will not be adjacent to a parking lane.

Table 1B was referenced. There will be one (1) through lane in the eastbound direction, the bicycle lane widths will be approximately 5-feet wide, and the speed limit is 25mph. Bicycle Lane blockage is rare. According to table 1B the future BLTS on South Street will be an LTS 2. However, considering South Street vehicle lane width will be reduced to 10-feet wide and it is a residential roadway, it is expected that with the addition of bicycle lanes the BLTS will operate as an LTS 1. Beyond bicycle safety, the inclusion of a contra-flow bicycle lane will also improve connectivity in the bicycle network.

3.2 Future Transit Analysis

There are currently eight (8) separate MBTA bus routes and a future Green Line Station located within ½-mile of the Project site. With the expected non-vehicular trip generation percentage of 61.8% for residential and 58.6% for retail, the Project is expected to generate approximately 32 public transportation trips in the Weekday AM Peak Hour, 35 trips in the Weekday PM Peak Hour, and 22 trips in the Saturday Midday Peak Hour (not discounting for any walking or bicycling trips). Many of these trips will be spread out over the entire public transportation system. Additionally, many of these trips, even during the same peak hour, would likely be on separate buses even if on the same route, given the available headways during the peak hours and weekdays. Therefore, it is expected that the existing bus routes and future Green Line stations will be able to accommodate the public transportation trips generated by the Project.

4. TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) refers to measures that can be put in place to minimize or lessen the impact of vehicular traffic to an area. Given the Site's proximity to MBTA bus routes and the future Union Square Station, as well as Somerville's already low levels of automobile use, the Project Site is an excellent candidate for the implementation of TDM. The most important objective in implementing a TDM is to provide appropriate and feasible alternatives to the single-occupant motor vehicle as the principal mode of travel to and from the site. A broad range of TDM strategies and tools are available. The Proponent is committed to implementing a TDM plan that includes tools and measurements, the extent of which will comply with the proposed land use and the geographic context.

4.1 TDM Measures

To limit the number of vehicle-trips that the site is expected to generate, the Proponent will promote transit accessibility, walk-ability, and bike-ability to residents. With the future Green Line Station at Union Square, as well as the multiple bus routes and bicycle access, emphasis will be placed on using these alternative modes of transportation instead of driving to the site. As part of the Mobility Management Plan submitted to the City of Somerville, the Applicant is committed to implementing TDM measures to reduce single occupancy vehicle use. These commitments are detailed in the Mobility Management Plan and summarized below:

- New pedestrian accommodations along site frontage
- Unbundled parking
- Provide MBTA passes per Condition #7 of the approved Mobility Management Plan
- Provide BlueBike memberships per Condition #8 of the approved Mobility Management Plan
- Shared-vehicle parking spaces on-site
- Posting real time transit information in the building lobby and facing the public sidewalk
- Annual Travel Surveys

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5. CONCLUSION

This Transportation Impact Study was prepared to analyze the potential impact of the development Project at 16-20 Medford Street in Somerville on vehicle and pedestrian operations in the area.

From a safety perspective, recent data shows the study intersections are relatively safe. One (1) study area intersection had a crash that involved a pedestrian resulting in a non-fatal. However, there were zero (0) reported fatal crashes, suggesting that conflicts between vehicles as well as vehicles and non-motorists are low speed. As such, the intersections will be able to handle the increased pedestrian and bicycle traffic generated by the Project site.

Trip generation was calculated using the ITE Trip Generation Manual in combination with the 2015-2019 American Community Survey (ACS) 5-year estimates for Means of Transportation to Work in Census Tracts 3512.03 and 3515, as approved by the City of Somerville. It is expected that the site will generate 17 vehicle-trips during the Weekday AM peak hour, 18 vehicle-trips during the Weekday PM peak hour, 208 vehicle-trips during a typical Weekday, and 21 vehicle-trips during the Saturday Midday peak hour. The calculations account for an approximate 60% reduction for non-vehicular residential trips. These vehicle-trips do not take into account for a reduction in vehicle-trips from the previous use of the site, thus presenting a more conservative analysis of the potential impact of the proposed mixed-use development.

Capacity analyses were performed for the study intersections for the Weekday AM, Weekday PM, and Saturday Midday peak hours. Analyses were carried out for 2022 Existing and 2022 Build conditions. Vehicle-trips were redistributed through the network due to the future re-orientation of South Street, resulting in improved level of service for some movements. As such, the Project at 16-20 Medford Street is not expected to have a significant impact on the surrounding traffic network

Based on the results of these analyses, DCI-GM2 believes that the proposed mixed-use development at 16-20 Medford Street will not have significant impact on traffic operations in Somerville, Massachusetts.

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